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Closing the "Revolving Door": Identifying Predictors of Time to Rehospitalization in a Sample of Psychiatric Inpatient Youth

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CLOSING THE "REVOLVING DOOR": IDENTIFYING PREDICTORS OF TIME TO REHOSPITALIZATION IN A SAMPLE OF PSYCHIATRIC INPATIENT YOUTH

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ABSTRACT

Previously a long-term mental health treatment option, inpatient psychiatric care is now an acute service for brief crisis stabilization and psychiatric reconstitution. Although lengths of stay have declined, rehospitalization rates have risen, calling into question the effectiveness of inpatient treatment and the extent to which inpatient and post-discharge, community-based services are working together to promote community tenure for youth. The present study had three aims: (1) evaluate the utility of the Child and Adolescent Needs and Strengths (CANS; Lyons, 1999) as an outcome assessment and decision support tool for youth inpatient hospitalization, (2) confirm a social ecological theory-informed factor structure of the CANS, and (3) identify individual youth and greater social ecological factors predicting time to psychiatric rehospitalization. Demographic, service-related variables, CANS, and Acuity of Psychiatric Illness—Child/Adolescent version (CAPI; Lyons, 1998) data was collected from 226 youth admitted to a private psychiatric inpatient hospital (*M* age=8.71, *SD*=1.95). Results from factor analysis strategies revealed that none of the tested models demonstrated good fit and factor analysis strategies did not converge with respect to the number of factors extracted and the items comprising these factors. However, results suggested a model of youth social and emotional functioning comprised of multiple, inter-related components. Survival analysis identified history of fire setting and previous

psychiatric hospitalization as significant predictors of time to psychiatric rehospitalization. Future research identifying evidence-based assessment tools for use in this treatment milieu and identifying factors across the social ecologies of youth that promote psychiatric stabilization and community tenure is indicated.

CHAPTER ONE

INTRODUCTION

The advent of managed care and the current emphasis on community-based services for children and adolescents has led to a reconceptualization of inpatient psychiatric services for youth. Rather than a long-term treatment option for mental health care, inpatient hospitalization is now used as a means of crisis stabilization and psychological "reconstitution" following florid psychopathology (Bisnaire & Greenham, 2009; Blanz & Schmidt, 2000; Lyons, 2004; Romansky, Lyons, Lehner, & West, 2003; Sharfstein, 2009). Current inpatient services remove youth from the community environment and place them in a highly structured hospital setting. This structure provides safety to both the community and the youth. Additionally, the highly structured environment of the hospital offers intensive psychological and psychiatric assessment, as well as the opportunity to provide closely monitored medication management. Lower levels of care, such as outpatient services, are now responsible for long-term treatment goals such as symptom reduction and peer and academic functioning. Acute inpatient hospitalization in its current conceptualization is intended to be an intensive, yet brief, treatment that aims to return youth to less-restrictive, community-based placements.

As a result of this recasting of the purpose of psychiatric hospitalization, lengths of stay for youth in inpatient care have declined significantly in recent years (Blanz &

Schmidt, 2000). However, at the same time that lengths of stay have decreased, rehospitalization rates have risen (Case, Olfson, Marcus, & Siegel, 2007; Romansky et al., 2003). Prior to the introduction of managed behavioral healthcare approximately 25% of youth experienced readmission to inpatient care within one year of discharge, whereas more recent studies of rehospitalization rates range from 30 to 50% (Arnold, Goldston, Ruggiero, Reboussin, Daniel, & Hickman, 2003; Blader, 2004; Dickey, Normand, Norton, Rupp, & Azeni, 2001). This increased rate of psychiatric readmission has led to questions regarding the quality of inpatient services for youth (Fontanella, Zuravin, & Burry, 2006), the availability of post-discharge services in the community, and the extent to which inpatient and community settings are working effectively together to meet youth mental health needs (Burns & Hoagwood, 2002; Lyons, 2001). Despite the documented increasing rates, there is limited research on the rehospitalization of youth.

Rehospitalization is considered by most to be an unfavorable outcome due to the cost of inpatient treatment and the stress and disruption that this acute treatment modality creates for youth and their families (Burns, Hoagwood, & Mrazek, 1999; Chung, Edgar-Smith, Baugher Palmer, Bartholomew, & Delambo, 2008; James et al., 2010). Psychiatric hospitalization was not designed to be a frequently utilized treatment option (Burns et al., 1999). Instead, inpatient treatment was intended to be a highly restrictive treatment environment for youth with severe mental disorders experiencing overwhelming psychiatric distress and its concomitant risk to self and others. Once the distress and risk subside, inpatient units aim to connect youth with aftercare services through discharge planning, thereby, assisting in the transition of youth back to the least restrictive environment possible, preferably community-based placement (Atlas, 1994;

Gold, Heller, & Ritorto, 1992). The system of care approach to behavioral healthcare emphasizes that the community is the preferred placement option for most child mental health problems (Blanz & Schmidt, 2000) and that stable community-placement is the desired outcome of acute inpatient treatment. According to the system of care model, inpatient and community-based services must work together to meet the behavioral health needs of youth and their families. Therefore, the rising inpatient rehospitalization rates also call into question not only the quality and effectiveness of both inpatient treatment for youth and community-based services implemented post-discharge (James et al., 2010), but also the extent to which these service entities are working together to provide coordinated care.

Numerous variables have been associated with the increased rate of youth readmission to psychiatric hospitals. The research falls into categories of predictors including clinical variables (Arnold et al., 2003; Blader, 2004; Fontanella, 2008; Romansky et al., 2003), environmental factors (Chung, et al., 2008; Romansky et al., 2003), and service related variables, including characteristics of both the inpatient treatment (Chung et al., 2008; James et al., 2010; Russo, Roy-Bryne, Jaffe, Ries, Dagadakis, & Avery, 1997; Swett, 1995) and post-discharge aftercare environment (James et al., 2010; Romansky et al., 2003). Although a number of factors have been implicated in the literature, the results found in this limited literature base are inconsistent and, at times, contradictory.

Additionally, the literature lacks a consistent theoretical approach to outcomes monitoring. Inpatient services are a part of the system of care's "continuum of care" and are essentially connected to community-based services with the shared goal of promoting

stable, community-based placement. Inpatient services provide acute psychiatric stabilization while community-based outpatient services are responsible for addressing long-term treatment goals and preventing psychiatric rehospitalization (Lyons, O'Mahoney, Miller, Neme, Kabat, & Miller, 1997). Moreover, within the rehospitalization literature, variables at the child (e.g., psychiatric diagnosis; Foster, 1999), family (e.g., risk of rehospitalization greater for youth with schizophrenia in high expressed emotion families; King & Dixon, 1999), and community level (e.g., availability of aftercare services; James et al., 2010) have been found to influence psychiatric relapse and readmission. Therefore, the application of a social ecological theoretical approach would be most appropriate in investigating the myriad of factors across settings that influence youth inpatient rehospitalization. Although research on youth inpatient hospitalization has included variables from multiple levels (e.g., James et al., 2010), no study to date has explicitly explored the influence of different social ecological systems on youth inpatient hospitalization. Future research is needed to address the inconsistencies of the literature and to apply a social ecological perspective to assess the relative importance of clinical and non-clinical social ecological system factors associated with readmission to inpatient care.

An additional limitation in the existing rehospitalization literature is that the extant studies have largely conceptualized rehospitalization as a dichotomous outcome: readmission or not within a specified amount of time (e.g., 30 days, one year). This dichotomy approach is significantly flawed in terms of external validity. For example in a study using 30 days as the cut-off for rehospitalization, youth who rehospitalize after 29 days are placed in the rehospitalized category while youth who rehospitalize after 31 days

are placed in the non-rehospitalized category, with no empirical support for why 30 days should be a meaningful criterion for making the category decision. For youth in the child welfare system, who have more significant and more complicated mental health needs and who utilize inpatient services more frequently compared to the general population (Burns et al., 2004), a goal of treatment is often to extend the amount of time between hospitalizations, which the dichotomy approach fails to capture. For youth with serious emotional disturbances, extending the time between hospitalizations could be considered to be a positive outcome as it indicates that the youth's ability to manage stressors in the community has improved. For example, Greenbaum and colleagues (2008) examined days between inpatient hospitalizations as a clinical outcome in a population of Medicaid-eligible children and defined shorter time between hospitalizations as a poor outcome in this high-needs population. Therefore, researchers should follow youth and investigate time between hospitalizations to expand their understanding of inpatient treatment outcomes.

Due to the expense of inpatient hospitalization and the restrictiveness of this type of care, it is essential that inpatient services are appropriately monitored and managed (Bisnaire & Greenham, 2009; Blanz & Schmidt, 2000; Stroul & Friedman, 1986). As the clinical intervention for youth with the weakest evidence base (Burns et al., 1999; James et al., 2010), inpatient hospitalization lags far behind other behavioral health domains in terms of developing its research base to support it as an evidence-based practice. It further lacks the same level of measurement sophistication in terms of valid and reliable assessment and outcome measures designed specifically to measure the outcomes of inpatient care and the accordant processes that reflect the goals of this form of care.

Currently there are not any consistently used assessment tools, guidelines, or care criteria to assist in inpatient decision-making, treatment planning (Leon, 2009), or aftercare placement (Fontanella, 2008). The use of an outcome measurement and decision support tool assessing variables at multiple ecological systems influencing youth emotional and behavioral functioning would insure inpatient facility accountability, improve the quality of discharge planning, and, with regard to research, would assist in establishing inpatient care as an evidence-based practice (Bisnaire & Greenham, 2009; Leon, 2009).

This study has three aims. First, it evaluates the utility of the Child and Adolescent Needs and Strengths (CANS; Lyons, 1999) as an outcome assessment and decision support tool for youth experiencing inpatient hospitalization. Using confirmatory factor analysis (CFA) this study will identify the factor structure of the CANS for this population, as well as streamline the CANS to create a briefer, more user-friendly version. The CANS instrument assesses the needs and strengths of a child or adolescent across multiple social ecological domains (e.g., individual, family). However, while the CANS was developed to guide service delivery for children with emotional and behavioral healthcare needs, its utility in a youth inpatient hospital setting has yet to be assessed. This study will compare the factor structure proposed by the author of the CANS to one based on social ecological theory. Second, this study aims to confirm the social ecological theory-informed factor structure of the CANS. Using principal components analysis (PCA), and principal axis factoring with various extraction and rotation techniques, this study will examine how these three methods of factor analysis (i.e., CFA, PCA, and principal axis factoring) converge with regard to the number of factors revealed and the items composing these factors. Convergence of the factor

analysis methods will support the proposed factor structure of the CANS based on the social ecological model that assesses functioning across individual and greater social ecological system domains. The third and final aim of this study is to identify individual youth and greater social ecological factors predicting time to youth psychiatric rehospitalization. Using survival analysis to model time to rehospitalization, this study will identify and compare the influence of significant predictors of readmission across individual youth, family, community, and healthcare systems, as well as examine literature-informed moderation hypotheses of some of these factors on time to rehospitalization.

CHAPTER TWO

YOUTH INPATIENT PSYCHIATRIC HOSPITALIZATION

History of Psychiatric Inpatient Care for Youth

The Mental Hygiene Movement of the nineteenth century is credited with introducing mental health treatment for children and adolescent to the United States (Lyons, 1999). With this movement came the acknowledgement of the differences between adults and children and the recognition that alternative treatment strategies were needed to address mental health issues in youth. This knowledge led to the identification of childhood as the developmental period during which symptoms of mental illness would first emerge. Inpatient psychiatric units were opened to serve children and adolescents with behavioral healthcare needs (Blanz & Schmidt, 2000) and child psychiatry was established as a distinct field of study in the 1920s and 1930s (Lyons, 1999; Parry-Jones, 1998). Prior to this time adults and youth were treated together and children were treated more as a curiosity than patients in need of mental health treatment (Blader & Foley, 2007). Initially these inpatient units served youth with post encephalitic brain disorders (Parry-Jones, 1998; Woolston, 1996). Inpatient care during this era primarily fulfilled a custodial capacity rather than providing treatment of emotional and behavior disorders (Blader & Foley, 2007; Hersov, 1994). The number of child inpatient units remained small during this time due to the belief that mental illness in children and adolescents was a rare condition (Blanz & Schmidt, 2000; Woolston, 1996).

As the field of child psychopathology expanded, the need for expanded mental health services for children and adolescents was recognized. The earliest separate inpatient units were reserved for children, leaving adolescents without access to intensive, developmentally informed inpatient mental health treatment (Parry-Jones, 1998). It was not until the late 1960s that adolescent units were opened to meet the needs of this population. Additional general and specific inpatient psychiatric facilities, particularly in the private sector, for children and adolescents proliferated in the 1970s and 1980s (Blader & Foley, 2007; Woolston, 1996). These facilities aimed to provide comprehensive and multidisciplinary mental health assessment and treatment to youth whose needs could not be met by outpatient services (Blanz & Schmidt, 2000; Woolston, 1996). Patients were treated in this therapeutic living environment using individual and group psychotherapy techniques (Parry-Jones, 1998). Inpatient units not only provided mental health treatment, but also diagnostic evaluations. These inpatient facilities served both long- and short-term functions and had lengths of stay ranging from several weeks to several months. Evidenced by these lengthy inpatient stays, inpatient care facilities struggled to meet the diverse psychiatric needs of the children and adolescents in residence (Green & Burke, 1998). Standards for admission and discharge were unregulated (Blader & Foley, 2007). Youth were admitted under liberal admission criteria and discharge decisions were subjective.

Two legislative decisions also supported the proliferation of inpatient care for youth in the 1970s and 80s: *Parham v. J. R.* (1979) and *Metropolitan Life Insurance Co. v. Massachusetts* (1985). The *Parham v. J. R.* (1979) decision gave parents the authority

to commit their children, under the age of 18, to an inpatient facility for mental health treatment against their will and the 1985 *Metropolitan Life Insurance Co. v. Massachusetts* ruling required insurance companies to provide certain mental health benefits to policyholders.

Motivated by the introduction of managed care to behavioral health and the push for use of community-based services, inpatient mental health treatment underwent a shift in conceptualization and became more regulated and monitored during the late 1980s and 1990s. Managed care brought with it strict criteria to support and justify the admission of youth to inpatient care (Blader & Foley, 2007). Investigation into certain private inpatient facilities found evidence of the inappropriate admission of youth into care (Woolston, 1996). *Parham v. J. R.* (1979) was held partially responsible for these unjustified admissions, especially for adolescents admitted due to behavior issues alone. According the Supreme Court ruling in *Olmstead vs. LC* (1999), inappropriate admission of a minor to inpatient care is both discriminatory and unethical due to the American's with Disabilities Act (ADA) that requires individuals with mental and/or physical disabilities be treated in the least restrictive environment possible.

Political urgings and financial concerns resulted in a reduction of the total number of beds in inpatient facilities for youth as well as a reduction in the average length of stay (Blanz & Schmidt, 2000; Case et al., 2007; Parry-Jones, 1998; Woolston, 1996). However, admission rates have remained roughly the same, or have increased, and readmission rates have gone up (discussed in section on predictors of rehospitalization later in the introduction; Wickizer, Lessler, & Boyd-Wickizer, 1999). Policymakers

realized that an exorbitant amount of mental healthcare funds were being spent on inpatient services, taking away funds from more cost effective and often more appropriate community-based care placements. For example, residential and inpatient mental health services for children and adolescents made up 78% of the $3.5 billion spent on mental healthcare in the United States in 1986 (Woolston, 1996). The disproportionate allocation of funds to expensive inpatient care left community-based services underfunded. The recognition by policymakers of the scarcity of community resources and the expense of inpatient services prompted greater support of system of care principles, especially those related to providing a comprehensive continuum of care (Blader & Foley, 2007). Funds were reallocated to community-based mental health services in efforts to avoid inpatient hospitalizations and to improve and expand the resources necessary to bolster the ability of youth with mental health issues to function in and achieve stable placement in the community. For example, the National Institute for Mental Health developed the Child and Adolescent System Program (CASSP) in 1984. CASSP worked on the state and community level to treat youth with severe emotional disturbances (SEDs) and their families in a community setting (Lyons, 1999; Stroul, Blau, & Sondheimer, 2008) and adopted the system of care philosophy, defined by Stroul and Friedman (1986) as a "comprehensive spectrum of mental health and other necessary services which are organized into a coordinated network to meet the multiple and changing needs of children and their families" (p. 3).

The trend away from inpatient services was also fueled by criticism regarding value of inpatient care (Parry-Jones, 1998). In addition to the popularity of the system of

care philosophy, there was also a strong anti-institutionalization trend that extended not only to inpatient care, but also residential treatment. The improvement of outpatient and day treatment facilities made these treatment modalities a more attractive option in the eyes of critics than restrictive and costly inpatient treatment. Critics were also skeptical of inpatient care due to the dearth of research on its effectiveness for improving clinical outcomes in youth, especially in the current restricted funding environment

The push toward a system of care philosophy and community-based placement and the criticism of youth inpatient services came to Illinois with the American Civil Liberties Union (ACLU) lawsuit against the Illinois Department of Children and Family Services (IDCFS) in 1991. This lawsuit, *B.H. v. McDonald*, charged IDCFS with neglecting and endangering youth served in the child welfare system. The consent decree that arose from the lawsuit required the overhaul of Illinois' mental health system for youth in child welfare to make it in line with the CASSP model, which advocates for placement in the community in the least restrictive environment possible (Stroul & Friedman, 1986). Overall, the mandates required IDCFS to insure that all placement decisions are consistent with the best interest and the needs of the child. Specifically, the consent decree charged IDCFS with establishing a permanency goal for all youth, requiring administrative case reviews, setting up a system for case management, performing a special review of cases with multiple placements with a specific period of time, and carrying out initial social and risk assessments prior to placement. These *B.H.* litigation and consent decree mandates required IDCFS to establish systems that connect

youth in Illinois' child welfare system with community-based services that meet their needs in the least restrictive environment possible (Leon, 2009).

Along with a reduced availability of inpatient beds, shortened episodes of care, and greater commitment to a system of care model, the goals of inpatient care for children and adolescents have been reexamined. For example, from 1990 to 2000 the average LOS in an inpatient facility for youth was reduced from 12 days for intake, treatment, and discharge, to only 4 days (Case et al., 2007). No longer a long-term treatment provider, inpatient services have now been repackaged as a means of crisis management, psychiatric evaluation, and acute care (Sharfstein, 2009). Inpatient units are now charged with providing the "bare minimum necessary intervention" (Blanz & Schmidt, 2000, p. 704) to stabilize children and adolescents psychiatrically and with returning youth to less restrictive care environments for long-term treatment and case management. In this way inpatient care provides a highly specialized service in the continuum of care by providing intensive care services in the form of crisis stabilization and psychiatric assessment (Leon, 2009; Sharfstein, 2009). Therefore, the goals of pediatric inpatient care are fourfold: (1) to meet the psychiatric needs of the most severe, complex, and critical youth; (2) to focus on crisis stabilization and reduction of risk; (3) to conduct a comprehensive assessment and diagnosis when necessary, and (4) to create a bridge between the inpatient facility and the community where youth can receive treatment in a less-restrictive setting (Atlas, 1994; Gold et al., 1992).

Measuring Acute Inpatient Treatment Outcomes

Despite the current push for evidence-based treatment and the voiced criticism regarding the value of inpatient care for children and adolescents, there continues to be a dearth of research on the efficacy of youth inpatient treatment. Pediatric inpatient treatment evaluation is essential as it leads to a greater understanding of the inpatient milieu, provides feedback to clinical staff members, which would, in turn, improve the care provided, and ensures accountability on the part of inpatient facilities (Pfeiffer & Strzelecki, 1990). The majority of available efficacy research consists of small-scale studies that suffer from methodological flaws, including lack of appropriate statistical analysis, reliance on qualitative reports, and, therefore, on subjective biases and judgments of the reviewers (Blanz & Schmidt, 2000; Epstein, 2004; Imrie & Green, 1998). Additionally, the changing goals of inpatient hospitalization for youth, that is the transition from long-term comprehensive behavioral health care to acute crisis stabilization, result in a multitude of different inpatient models being classified as "inpatient" care over time, compromising the ability to generalize findings and producing contradictory results amongst outcome studies.

Arguably the most problematic issue facing the youth inpatient treatment outcome literature is the inconsistency in how outcome is operationalized. The majority of the current literature base measures symptom reduction. Treatment success under the symptom reduction approach is measured by observable change in maladaptive youth behavior (Bettmann & Jasperson, 2009). For instance, Setoya et al. (2011) assessed psychiatric inpatient treatment of youth in Japan using the Children's Global Assessment

Scale (CGAS), Youth Self Report (YSR), and Child Behavior Checklist (CBCL). These assessment measures were conducted at intake and discharge and treatment success was defined as positive change in symptomatology. Researchers employing this outcome measurement define treatment success as the reduction of maladaptive behaviors and symptoms.

Other studies assess functioning as the treatment outcome, particularly social and family functioning. Treatment success in these studies is measured by assessing change in family dynamics as well as change in individual youth functioning in various social environments. For example, Hooper and colleagues (2000) assessed adolescent functioning following discharge across three environments: legal, academic, and level of care. The functioning ratings in these settings were subjective and dichotomized as either "satisfactory" or "unsatisfactory" based on whether youth were consistently participating at school and evidencing no new legal issues post-discharge. Additionally, in terms of family functioning, many inpatient units encourage family participation in treatment. This practice is based on the theory that therapeutic growth takes place in an environment combining both peer and family influences, as well as the fact that most youth return to their family setting following inpatient treatment (Barth, 2005).

While symptom and functioning improvement should be a part of the goals of any behavioral health intervention, they are not specific to the goals of psychiatric hospitalization: Youth do not get hospitalized in today's healthcare environment because they have psychiatric symptoms or functioning deficits, but because they have become compromised to the point where they are a risk to themselves or others. Seen in this

light, children are improving when they are better able to cope with the stresses of life without becoming so distressed that they become a risk to themselves or others. One way to assess a child's capacity to better manage stress without becoming psychiatrically compromised is to measure how long youth stay out of the hospital. Therefore, rehospitalization is the outcome more closely aligned with the current goals of hospitalization and its current place in the continuum of care. However, the literature on time to rehospitalization is limited and not grounded in any theories that would allow for the reasoned proposal and testing of hypotheses. This study attempts to address the limitations of the current youth inpatient hospitalization outcomes literature by using a social ecological perspective to assess youth functioning across different systems and by using time to psychiatric rehospitalization as the outcome.

Youth Inpatient Outcomes from a Social Ecological Perspective

Assessing youth inpatient outcomes from a social ecological perspective is consistent with the system of care philosophy and provides a valuable framework for understanding the multitude of forces impacting both the youth and family (Cook & Kilmer, 2010). The ecological systems theory (Bronfenbrenner, 1979, 1992) conceptualizes the ecological environment of the youth as nested structures with the developing person at the center. The first, innermost system, the microsystem, is the immediately surrounding setting containing the developing person. The microsystem includes interactions and relationships that occur in the immediate setting of the youth including the home, school, and neighborhood setting. Bronfenbrenner emphasized the bidirectional nature of relationships within the microsystem, such that the microsystem

not only influences the youth, but the youth influences the microsystem. The second system, the mesosystem, consists of interactions between two or more microsystems. In this population, for example, the interaction between the inpatient unit serving the youth and the youth's family would be included in the mesosystem. The third system, the exosystem, represents the impact of greater ecological system forces, such as the availability of community resources, on the developing person. These external environments impact the youth, but in an indirect manner such that the youth does not directly interact with the exosystem, but is affected by what happens within the exosystem. The final system, the macrosystem, represents the influence of larger cultural beliefs and values, laws, and public policies on the youth. Included in the macrosystem, for example, would be the impact of managed care policies on access to services.

Bronfenbrenner's social ecological theory makes it clear that it is essential that both proximal and distal factors are assessed when studying youth, as their behavior is the result of these diverse influences on their developing lives. These ecological environments are not distinct, but rather they are nested within one another. The different ecological settings affect the developing person through direct interaction with the person (e.g., proximal influences, such as the family) and through more indirect means (e.g., a distal factor, such as socioeconomic status). Bronfenbrenner proposed, "behavior evolves as a function of the interplay between person and environment" (1979, p. 16). This process is reciprocal, dynamic, and evolving. Each interaction between person and environment results in change in both parties. The social ecological perspective highlights the numerous components influencing the developing person. By applying this

perspective to the system of care model, relationships between people, social programs, processes, and environments can be investigated as contributing to the social and emotional health of youth and families (Cook & Kilmer, 2010).

There is strong support for the social ecological model in the child psychopathology and mental health services literature. For example, the currently accepted etiological model for the development of youth psychosis, a presenting problem for many youth referred to inpatient services, suggests a diathesis-stress framework, highlighting the contribution of both a genetic vulnerability and the experience of stress life events (Asarnow & Asarnow, 2003). Genetic factors, central nervous system damage from birth complications, inadequate learning environments, and the experience of abnormal family communication patterns have been suggested as vulnerability factors for developing psychosis (Asarnow & Asarnow, 2003). These risk factors include variables within the individual youth, as well as factors embedded within the microsystem (family factors) and exosystem (school resources), drawing attention to the influence of factors across the social ecologies of youth in determining social and emotional health.

The Application of Social Ecological Theory to Behavioral Health

Bronfenbrenner's social ecological theory serves as the theoretical foundation of multisystemic therapy (MST; Henggeler, Schoenwald, Bourduin, Rowland, & Cunningham, 1998), an innovative behavioral health intervention designed to change the social ecologies of youth with significant emotional and behavioral issues and their families. The two primary assumptions of social ecological theory—that behavior is multidetermined and interpersonal interactions are bidirectional and reciprocal—have

important clinical implications for MST (Randall & Henggeler, 1999). Due to the multidimensional determinants of behavior, MST considers the role of factors within the individual youth, as well as characteristics of the multiple, intertwined systems in which the youth is embedded (e.g., family, peer, school, community) when addressing problem behaviors. As a result of the nature of interactions, MST aims to determine how youth problem behaviors "fit" into their systemic context and to focus on the interpersonal relationships linked with identified problems (Randall & Henggeler, 1999). Overall, MST proposes to empower families to create healthy social ecologies through the bolstering of protective factors and attenuation of risk factors (Henggeler, Schoenwald, & Pickrel, 1995).

MST consists of a combination of empirically-supported intervention techniques (e.g., cognitive-behavioral practices, social learning interventions, and pragmatic family therapies) formatted into a social ecological model (Letourneau, Cunningham, & Henggeler, 2002). The intervention is operationalized by adherence to nine treatment principles, consistent with the underpinnings of social ecological theory and the goals of the system of care. Intervention principles include that MST identify the connection between the identified problem and systemic context through assessment, focus on youth and family strengths to lever change, promote responsible behavior within the family system, be developmentally appropriate, require the cooperation and effort for the entire family system, measure efficacy from multiple perspectives, and generalize and maintain treatment gains across systemic contexts through empowerment of caregivers.

A recent meta-analysis found that youth and their families treated with MST were functioning better and demonstrating less delinquent behavior than 70% of their counterparts served with alternative treatment strategies (Curtis, Ronan, & Borduin, 2004). Specifically, MST significantly reduced emotional and behavioral problems in individual youth, improved parent-youth and overall family interactions, decreased youth aggression toward peers and involvement with deviant peers, and reduced youth criminality.

Recently, MST has been modified for use to treat youth in psychiatric crisis, making it an apt comparison to youth psychiatric inpatient care. MST modifications include utilization of more intensive services and psychiatric support to meet the complex needs of youth, inclusion of more short-term out-of-home care options (e.g., respite care) and extension of therapeutic support for the family (Sheidow et al., 2004). In a randomized, controlled trial investigating the use of MST as an alternative to psychiatric hospitalization with community aftercare, MST demonstrated superior short-term effectiveness in reducing youth clinical outcomes including externalizing symptoms, internalizing symptoms, and global severity of symptoms (Henggeler et al., 1999; Schoenwald, Ward, Henggeler, & Rowland, 2000). However, MST treatment gains dissipated one-year following referral (Henggeler et al., 2003; Sheidow et al., 2004) and it is important to note that both treatments produced significant reductions in youth clinical symptoms (Henggeler et al., 2003). These findings suggest that adherence to social ecological principles may produce more rapid results in youth in psychiatric crisis and support the application of social ecological theory in this study of inpatient care.

As reflected in the treatment principles of MST, when applied to behavioral health, social ecological theory suggests that both positive and negative behaviors are influenced by interpersonal or intersystem factors. Therefore, when working to ameliorate negative behavior, clinicians must identify problematic interactions across systems that maintain the negative behavior and work to promote healthy social ecologies that support positive functioning. However, traditional outcomes research in the system of care and pediatric inpatient literature has chiefly focused on the influence of formal services and agencies on the mental health of youth through the evaluation of the relationships amongst mental health services and agencies in coordinating care and the relationships between these formal entities and the families in need (Cook & Kilmer, 2010). The study of youth inpatient outcomes specifically has been assessed in an even more limited fashion. This literature investigates primarily individual youth factors (e.g., psychiatric diagnoses of the youth) and formal agency factors (e.g., length of stay in inpatient facility) and largely ignores greater social ecological system factors, such as the influence of the family, community, and education system on the child, as well as any number of interactions between these system factors.

Youth Inpatient Rehospitalization from a Social Ecological Perspective

A social ecological framework is critical to the understanding of youth inpatient outcomes and is particularly relevant to the study of youth rehospitalization. First, psychiatric rehospitalization reflects the combined influence of youth symptom factors (e.g., severity) and contextual factors (e.g., family system functioning; Andersen & Newman, 1973). The overall system of care, which includes inpatient services as well as

community providers, in collaboration with families is responsible for preserving community tenure for youth. Coordination of these different systems is essential in keeping youth in the community and preventing rehospitalization. Second, the child psychopathology literature points to the influence of individual youth and environmental factors in the manifestation of mental illness. The presenting problems that bring youth into inpatient services are the result of factors across the social ecologies of the youth. These problem behaviors can be maintained post-discharge from inpatient services by problematic interactions within and across systems (Letourneau et al., 2002). Therefore, the examination of factors across the social ecological systems of the youth is essential in community-placement success.

Finally, rehospitalization is the shift between inpatient hospitalization and community-based placement. This shift is an example of what Bronfenbrenner calls an ecological transition, which occurs "whenever a person's position in the ecological environment is altered as the result of a change in role, setting, or both" (1979, p. 26). Role transitions may be the arrival of a baby sibling to an only child, a child being held back and having to repeat a grade, a woman becoming a single mother after a divorce, or an employee being promoted to manager. Ecological transitions resulting in change in both the setting and social position, such as a child entering day care, an adolescent graduating high school, or an older adult retiring, occur in the mesosystem. Discharge from inpatient care is both a role and setting change as youth transition from the role of patient to citizen and from the inpatient to community setting. Each of these transitions brings with it developmental consequences that include the introduction of new

relationships, social structures, and involvement in new activities (Bronfenbrenner, 1978). Discharge from inpatient care is a particularly important ecological transition for youth served in the system of care, because the system of care promotes service provision in the least restrictive environment possible and community tenure. By identifying predictors of successful transition from inpatient care to community-based placement, the system of care can promote the development of these factors to improve youth inpatient hospitalization outcomes. The social ecological approach emphasizes the importance of exploring the ecological environment surrounding the youth to gain a more nuanced understanding of a youth's developmental trajectory. Therefore, this study will adopt a social ecological framework to study predictors of time to youth inpatient rehospitalization.

Application of Social Ecological Theory in the Measurement of Youth Needs and Strengths

Using the Child and Adolescent Needs and Strengths (CANS; Lyons, 1999), a service planning and decision-support assessment tool examining the needs and strengths of the individual youth and family, the Acuity of Illness—Child and Adolescent version (CAPI; Lyons, 1998), a measure of psychiatric symptom acuity, and service usage information, this study will examine the influence of social ecological system variables, as well as interactions between these systems, on youth inpatient treatment outcomes. Specifically, this study will be examining individual youth, family, and greater social ecological system factors influencing time to youth inpatient rehospitalization. Although the dimensions and conceptual factors of the CANS were developed through focus

groups consisting of families, family advocates, representatives of the provider community, mental health case workers and staff and it has been found to be a reliable and valid assessment tool, there is a dearth of research evaluating the psychometrics of the CANS factor structure. The creators of the CANS suggest that dimension scores can be generated by summing the items within each factor and that these dimension scores can be used as a valid outcome measurement strategy for residential treatment (Praed Foundation, 1999); however, without confirmation of the factor structure, this method of outcome measurement is inappropriate as it assumes that individual items share variability and represent underlying dimensions without supporting empirical evidence. Additionally, the creators of the CANS note in the administration manual that it was designed at an item-level, making it possible for clinicians to modify the CANS items to serve their particular needs and service provision culture (Lyons, 1999). However, this flexibility allowed by the creators of the CANS complicates the standardization of the tool, and there are now dozens of versions of the tool in use throughout the world. This study will use confirmatory factor analysis (CFA) to compare the fit of the five-factor model proposed by the author of the CANS to a six-factor model informed by social ecological theory.

The six-factor CANS model is based on social ecological theory and was developed through consideration of the ways that youth interact with their environment and through examination of factors predicting pediatric rehospitalization in the inpatient literature. Additionally, the factor structure presented below was informed by applications of social ecological theory in the pediatric psychology literature (e.g., Bellin

et al., 2010; Essner & Holmbeck, 2010; Raneri & Wiemann, 2007). The classification scheme of these pediatric psychology studies is based on the social ecological theory construct of levels of influence (e.g., individual, family, peer/community, healthcare system); this study will follow the same organizational strategy. However, the proposed model breaks down the individual youth factor further to present a more nuanced look at the multiple components within the individual youth influencing social and emotional functioning.

Within the suggested six-factor model, four factors pertain to what the individual youth brings into their interaction with various environments and two factors relate to variables associated with different social ecological systems youth are embedded within. Specifically, the four individual youth factors proposed are as follows: youth strengths, youth capacity, youth emotional/behavioral needs, and traumatic stress symptoms. Youth strengths include variables such as optimism, talents/interests, and well-being. These variables contribute to a youth's outlook and support the building of strong relationships with greater social ecological systems. Additionally, systemic strengths are often used as levers for change during intervention (e.g., in MST). Youth strengths are siphoned out in this factor model to assist in identifying the youth's readiness for change. Youth capacity includes variables related to intelligence, physical functioning, and medical issues. These are stable characteristics that youth's access to, reliance upon, and contribution to interactions with greater social ecological systems are dependent. These characteristics also assist in determining the developmental level and needs of youth which influence intervention goals and barriers to treatment success. Youth emotional/behavioral needs

and traumatic stress symptoms also influence access, reliance, and contribution to relationships with greater social ecological systems; however, variables in these proposed factors are more fluid and their onset is often the result of an environmental trigger. According to the diathesis-stress model, onset of psychological disorders is the result of a combination of the individual's genetic predisposition for the condition and the experience of a stressful event. The youth emotional/behavioral needs factor captures mental health issues that may be the youth's reaction to an environmental trigger. This factor mostly consists of variables related to externalizing behavior, which are actions directed toward others, and therefore, have a distinctly interpersonal nature. The proposed traumatic stress symptoms factor is comprised of symptoms specifically associated with posttraumatic stress disorder (PTSD). These variables result from the experience of a traumatic event, which is a highly specific interaction with the environment.

The factors related to the social ecological systems themselves are family functioning and greater social ecological system functioning. The proposed family functioning factor consists of variables assessing the overall health of the family system, as well as specific aspects related to the youth's interaction with this system, such as attachment. Family is distinct from the other social influences in the proposed factor model as the family is responsible for implementing treatment plans in the home, is often a negative, maintaining factor of youth problem behavior according to social ecological theory, and is, therefore, instrumental in a successful transition from inpatient care to community-based placement (Blader, 2004). Finally, the proposed greater social

ecological system functioning factor reflects the youth's interaction with more distal system, such as school and the community. These greater social ecological system variables are particularly relevant to the pediatric inpatient population as the community assumes partial responsibility in maintaining community tenure post-discharge through the provision of services.

It is important to note that although this study adopts a social ecological perspective as a framework for examining factors influencing stability of community-based placement, it does not employ a traditional outcomes monitoring from a social ecological perspective, which is conducted in a bidirectional fashion from the perspective of multiple informants. However, this study does examine the ecological transition from inpatient to community-based placement and assess the influence of multiple ecological systems on this transition.

The Current State of Youth Inpatient Rehospitalization

Inpatient mental health services for children and adolescents experienced significant changes with the onset of managed mental health care and the increased use of psychotropic medication to treat mental illness. A nationally represented study of inpatient services for youth at community hospitals reported a significant decrease in length of stay (LOS) and cost of treatment between 1990 and 2000 (Case et al, 2007). Total days in treatment declined by over 50%. On average, the evaluation, treatment, and discharge of a youth in an inpatient facility would take 12 days in 1990. By 2000, the same youth would undergo the same process in merely four days. Such findings suggest that inpatient mental health professionals are "doing more with less" in light of the

economic climate and rising rates of youth on psychotropic medication (Case et al., 2007, p. 94). However, it is unclear how this change in community inpatient hospitals is impacting rehospitalization rates as the aforementioned study de-identified youth and, therefore, could not identify readmissions. Additionally, the verified reduction in LOS for youth inpatient care suggests that inpatient treatment may be merely a "revolving door" for crisis stabilization, rather than a comprehensive treatment option (Chung et al., 2008). However, there has yet to be a comprehensive study completed to document trends in inpatient psychiatric hospitalization and rehospitalization for youth across both private and public hospitals and to address quality of care concerns regarding the facilities themselves.

Studies of admission rates to private youth psychiatric hospitals suggest significant increases in usage, with approximately 43000 admissions recorded in 1986 to 149000 admissions recorded in 1997 (Substance Abuse and Mental Health Administration, 2001). This increase in private psychiatric hospital service usage may indicate a general trend toward care in private settings, suggesting that private hospitals may be utilized to rehospitalize youth previously treated at community hospitals (Case et al., 2007). Although there is preliminary evidence that reductions in LOS have increased readmission rates for youth after the introduction of managed care (e.g., Figuerora, Harman, & Engberg, 2004; Wickizer, Lessler, & Boyd-Wickizer, 1999), future research is needed to probe these findings further, to include both community and private hospitals, and to tease apart the influence of changing LOS and quality of care. However, it appears that there is a significant risk in the decreased length of stay documented in

youth inpatient hospitalization, evidenced by the increasing rates of youth inpatient readmission. The inverse relationship between LOS and rehospitalization highlights a breech in the SOC and continuum of care models and the importance of rehospitalization as a youth inpatient hospitalization outcome variable representing ecological transition failure. Additionally, using rehospitalization as the outcome of choice when examining youth inpatient hospitalization is consistent with the system of care philosophy that promotes community-based placement as its centerpiece and aims to keep youths out of out-of-home placement for as long as possible.

Estimates regarding rates of rehospitalization among children and adolescents vary depending upon the population and follow-up period. Arnold and colleagues (2003) found an 18.9% readmission rate at six-month follow-up. Similarly, another study with a one-year data collection period and no follow-up measures reported a 16% readmission rate of youth within that year (Chung et al., 2008). Rehospitalization rates one-year following discharge are consistently reported to be between 32 and 38% (Arnold et al., 2003; Blader, 2004; Fontanella, 2008). Not surprisingly, studies employing longer follow-up periods yield higher rehospitalization rates. A study of youth following their first psychiatric hospitalization found the rate of rehospitalization to be 43% at thirty-month (i.e., 2.5 year) follow-up (James et al., 2010). Arnold et al. (2003) reported 48.5% of the formerly hospitalized adolescents in their study were rehospitalized at 10-year follow-up. The youth rehospitalization literature also suggests there to be a risk period for readmission to inpatient care. Research shows that rehospitalizations cluster in the first three-months following discharge with the greatest risk of readmission within the

first 30 days (Blader, 2004; Fontanella, 2008; James et al., 2010). This elevated risk of readmission in the immediate discharge period following inpatient treatment underscores the need for developing connections between inpatient care and community-based mental health services to improve continuity of care and insure that the behavioral health needs of these youth are being met (James et al., 2010).

Factors Associated with Psychiatric Rehospitalization of Youth

A number of individual youth and greater social-ecological factors are associated with an increased risk of rehospitalization to an inpatient psychiatric facility.

Individual Youth Factors

Youth emotional/behavioral needs. Research on youth psychiatric diagnosis suggests a number of diagnoses as predictors of readmission, including mood disorders (Arnold et al., 2003; Asarnow, Goldstein, Carlson, Perdue, Bates, & Keller, 1988; Foster, 1999), disruptive behavior disorders (Blader, 2004; Chung et al., 2008; & Foster, 1999), and psychotic disorders (Pavkov, George, & Lee, 1997), with the strongest evidence for the relationship between disruptive behavior disorders (e.g., oppositional defiant disorder) and rehospitalization. Newton and colleagues (2000) confirmed the causal relationship between externalizing behaviors and instability in placement out of the home (e.g., rehospitalization). The study found behavior issues to both predict foster home placement instability and be a result of multiple changes in out-of-home placements (Newton, Litrownik, & Landsverk, 2000), suggesting a coercive cycle between externalizing behavior and unstable placement. Illness factors, such as increased severity of symptoms (Fontanella, 2008; James et al., 2010) and psychiatric comorbidity (Arnold

et al., 2003; Asarnow et al., 1988) have also been implicated in predicting rehospitalization. However, there are some discrepancies in the literature as to the relationship between psychiatric diagnoses and rehospitalization. There has been inconsistent evidence regarding the influence of diagnoses (Asarnow et al., 1988; Pavkov et al., 1997) on youth inpatient rehospitalization. Additionally, some researchers contend that there is no relationship between youth psychiatric diagnosis and the likelihood of readmission (Bobier & Warwick, 2005; Romansky et al., 2003).

Youth trauma. There is limited research pertaining to the relationship between youth trauma and risk of rehospitalization. However, there is some evidence that a history of childhood sexual abuse (Bobier & Warwick, 2005; Romansky et al., 2003) and physical abuse (Cornsweet-Barber, Rosenblatt, Harris, & Attkisson, 1992) predict rehospitalization. Interestingly, Foster (1999) found youth a diagnosis of PTSD to have a lower risk of rehospitalization (Foster, 1999). However, the Foster (1999) study looked at a sample of youth from military families and did not include any youth within the child welfare system, a population in which the experience of trauma is the essential inclusion criteria (i.e., experience of abuse and/or neglect). The inconsistencies in the literature suggest that the relationship between trauma and rehospitalization may be dependent on trauma type or group membership, such as child welfare.

Youth strengths. Youth rehospitalization has yet to be examined from a positive psychology perspective. As a result, there is an absence of research exploring the relationship between internal youth strengths and risk of rehospitalization. In a study of adolescents hospitalized for suicidal ideation, Enns, Cox, and Inayatulla (2003) examined

the relationship between adolescent personality characteristics and risk of rehospitalization. They found that adolescent neuroticism (e.g., tendency to experience negative emotional states) predicted rehospitalization (Enns, Cox, & Inayatulla, 2003), suggesting that the absence of youth strengths such as optimism and self-efficacy may hinder success in the ecological transition between inpatient hospitalization and community placement.

Youth capacity. Few studies have included youth capacity factors in their analyses due to low cognitive functioning often being an exclusionary criterion. However, there is limited research suggesting that a diagnosis of mental retardation (Fontanella, 2008), a learning disability (Bobier & Warwick, 2005; Romansky et al., 2003), or serious developmental delay (Romansky et al., 2003) is associated with an increased risk of rehospitalization.

Demographics. Demographic factors are another category of individual youth variables under investigation as related to youth inpatient readmission. However, the literature examining these variables is inconsistent and, at times contradictory. Some research suggests that younger youth are more likely to be rehospitalized compared to their older peers (Arnold et al, 2003; Bobier & Warwick, 2005; Pavkov et al., 1997; Romansky et al., 2003). Researchers suggest that this relationship may be because younger youth are more vulnerable and in need of a highly restrictive care environment or that younger youth receive greater parental assistance, allowing them access to expensive inpatient services. However, Fontanella (2008) found older adolescents to be at a greater risk of rehospitalization than younger adolescents in a population of Medicaid

eligible adolescents, clouding the relationship between age and rehospitalization and suggesting a possible interaction between youth age and family functioning.

The majority of literature does not report a significant relationship between gender or race and readmission to an inpatient facility (e.g., Blader, 2004; Foster, 1999; Romansky et al., 2003). The remaining research is contradictory, for example, Arnold et al. (2003) found Caucasian youth at greater risk of rehospitalization and Pavkov et al. (1997) found African American youth at greater risk of inpatient readmission. Although trauma, strengths, capacity, and demographic variables have received some attention in the literature, they are not consistently evaluated and study results are often contradictory, casting doubt on the relationship between clinical factors outside of diagnosis and severity and rehospitalization.

Family System Factors

Family system factors have also been implicated in the literature as contributing to youth inpatient rehospitalization risk. First, parents play an integral role in seeking youth psychiatric rehospitalization or following through with recommendations to readmit (Blader, 2004). Second, parents are responsible for creating a home environment conducive to maintaining inpatient treatment gains (Fite et al., 2009). Lastly, family factors may influence the youth's clinical course post-discharge from inpatient care (Blader, 2004), thereby impacting youth rehospitalization risk.

There is consistent evidence that the parent-child relationship is associated with youth rehospitalization. Conflict within the parent-child relationship (Blader, 2004; King, Hovey, Brand, & Ghaziuddin, 1997), low positive parental involvement (Blader,

2004; Brinkmeyer, Eyberg, Nguyen, & Adams, 2004; Lakin, Brambila, & Sigda, 2004), and high expressed emotion within the family (King & Dixon, 1999) are all identified predictors of youth rehospitalization. Further, there is evidence that family factors, specifically use of corporal punishment and harsh disciple strategies, mediate the transmission of parental psychiatric disorders to the development of a psychiatric disorder within the child (Blader, 2004), highlighting the importance of positive parenting for child mental health and suggesting an interaction between youth emotional/behavioral needs and family functioning.

Interestingly, Blader (2004) found that parental stress attenuated the influence of other rehospitalization risk factors; that is to say that more reported parental stress reduced the risk of youth rehospitalization. It may be that greater parental stress is an indicator of increased emotional engagement, protecting against rehospitalization through a positive parent-child relationship. Alternatively, higher reported parental stress may interfere with seeking further inpatient care, thus reducing the risk of rehospitalization.

Living arrangement. A youth's home placement and custody status has also been found to be associated with inpatient rehospitalization. Congregate care setting placement (e.g., residential treatment, group home, correction facility; Chung et al., 2008; Romansky et al., 2003) and child welfare custody status (Burns et al., 2004) are associated with an increased risk of rehospitalization. Specifically, Romansky and colleagues (2003) found the rehospitalization rate to be over 25% for youth placed in a congregate care setting post-discharge from inpatient services, compared to the 20% rate of youth placed in foster homes and the 13% rate of youth living independently or with a

family member (parent or relative). Chung and colleagues (2008) suggest that the higher rate of rehospitalization found in youth placed in congregate care settings may be due to the lower threshold for psychiatric hospitalization of the staff members. However, other research suggests that placement in a lower level of care out-of-home placement (i.e., treatment foster care) is associated with youth rehospitalization (Fontanella, 2008). The inconsistency in the findings regarding the relationship between aftercare placement and inpatient readmission emphasizes the need for individualized discharge planning to meet the psychological needs of the youth and family.

Greater Social Ecological System Factors

Additionally, youth are influenced by the post-discharge environment and greater social-ecological system factors at play within that environment.

Community. Despite the role of the community in preserving youth tenure in the community post-discharge, there is limited research examining the relationship between explicit community variables and risk of rehospitalization. However, there is evidence in one study that discharge to a low socioeconomic (SES) community is a rehospitalization risk factor (Pavkov et al., 1997).

Service/treatment history. Youth inpatient treatment history has also been found to predict rehospitalization (Bickman, Foster, & Lambert, 1996; Chung et al., 2008). Chung and colleagues (2008) found rehospitalization within one-year of discharge to be significantly associated with a history of prior out-of-home placements. It may be that these youth have more severe psychiatric problems to begin with, resulting in greater need for and utilization of acute inpatient services (Chung et al., 2008), or that

this subgroup of youth fail to receive effective post-discharge services in the community (Foster, 1999), highlighting the importance of linking high-risk youth with community-based services.

Length of inpatient stay. The adoption of managed care and the documented reductions in length of stay (LOS) for inpatient psychiatric hospitalization of youth (Case et al., 2007) has resulted in increased attention to the relationship between length of stay and rehospitalization. Wickizer and colleagues (1999) found application of a utilization management program, which decreased LOS, to result in decreased inpatient "resource consumption" and an increased risk of readmission. Figueroa and colleagues (2004) also found an inverse relationship between LOS and readmission, with slight decreases in LOS associated with significant increases in risk of readmission in a mixed population of adults and youth.

Aftercare services. Recently, post-discharge service factors have been under examination as predictors of rehospitalization. Although some research identifies use of post-discharge mental health services as a protective factor against rehospitalization (James et al., 2010; Romansky et al., 2003), other research has not found a significant difference in rehospitalization risk based on the amount of service hours a youth receives following inpatient discharge (Blader, 2004; Foster, 1999; Pavkov et al., 1997).

Reconsidering Readmission as a Dichotomous Outcome

Psychiatric inpatient care for youth is a part of the continuum of mental health care and the greater system of care for youth and families. Former President George W. Bush's New Freedom Commission on Mental Health (2003) charges mental health care

with the task of not only managing symptoms, but also "increasing consumers' ability to successfully cope with life's challenges, […] facilitating recovery and […] building resilience" (p. 5). The report also identifies empowering people to be "able to live, work, and learn and participate fully in their communities" as the goal of mental health care (New Freedom Commission on Mental Health Care, p. 5). It follows that youth inpatient hospitalization should aim to psychiatrically stabilize youth, promote skills that support youth in managing the complex, intertwined stressors of life in the community, and return youth to a stable, community-based placement.

The traditional dichotomous measurement of rehospitalization outcomes (i.e., rehospitalized or not) is challenged by this expanded view of the goals of inpatient hospitalization. Rather than inpatient success defined as not being rehospitalized, it seems more fitting for inpatient treatment outcomes to consider time between hospitalizations, with treatment success measured as increasing time between hospitalizations. This reconceptualization of rehospitalization outcomes is consistent with the continuum of care model, which suggests that the mental health needs of youth are best met by individualized youth care that is sensitive to the needs of the family and is based in the community (Stroul & Friedman, 1986). This model advocates for increased communication between care providers, particularly related to increasing awareness of the changing needs of the youth. Adoption of the continuum of care model aims to allow improvements in functioning made during inpatient hospitalization to persist in the community, thereby postponing readmission and promoting stable community placement (Foster, 1999).

Statistical analysis of the traditional dichotomous outcome, rehospitalized or not, ignores relevant aspects of patient cases and fails to provide a nuanced understanding of factors predicting rehospitalization (Singer & Willett, 2003). Dichotomization eliminates potentially important variation in event times by collapsing together all who experience the event and are rehospitalized and all those who do not experience the event during the data collection period. For example, a youth who is rehospitalized seven days after discharge and a youth who is rehospitalized 90 days after discharge are considered to have the same outcome, despite the fact that the second youth experienced significantly longer tenure in the community before being readmitted. The decision of when to dichotomize, at what point in time, is an arbitrary one. Therefore, contradictory conclusions can be made based on changes in time chosen to dichotomize. For example, choosing to dichotomize at six months post-discharge might suggest that males are rehospitalized at a higher rate than females, but changing the dichotomization point to one-year post-discharge may reveal that the rate of rehospitalization is consistent across sexes. Additionally, any information known about participants experiencing the event, after the dichotomization point is lost (e.g., if the youth is rehospitalized after the established dichotomization point). Most importantly, dichotomizing the outcome simplifies the research question and prevents an opportunity for researchers to examine the question of how long until rehospitalization. This question is particularly relevant in child welfare samples, where youth often experience numerous risks and hospitalization and rehospitalization is much more common.

Survival analysis can be used to expand our understanding of youth rehospitalization outcomes beyond the dichotomy of rehospitalized or not. This method of analysis not only determines if rehospitalization is influenced by certain variables, but also can compare the strength of the predicting variables through effect size calculations. The rate at which rehospitalization occurs is also modeled in survival analysis and represented as a survivor function, which is the rate of rehospitalization as a function of time (Tabachnick & Fidell, 2007). Survival analysis also accommodates those cases where time to rehospitalization is unknown either because the youth was not rehospitalized during the data collection period or because they were lost to follow-up.

Although initially designed for use in the medical field, survival analysis has been used in the youth inpatient rehospitalization literature to examine the relationship between rehospitalization and predictor variables. Foster (1999) used Cox proportional hazards modeling, a form of survival analysis, to determine the influence of aftercare services on readmission to an inpatient psychiatric facility for youth from the Fort Bragg Demonstration. Foster (1999) found that use of post-discharge services did not influence readmission to inpatient care. Likewise, Blader (2004) used Cox hazards modeling to investigate predictors of psychiatric inpatient readmission for children aged 5 to 12. More severe conduct problems, harsh parental discipline strategies, and a disengaged parent-child relationship were related to faster time to readmission. James and colleagues (2010) also used Cox hazard modeling to investigate predictors of rehospitalization of children and adolescents who experienced their first psychiatric hospitalization. The researchers found longer length of stay during first hospitalization and higher

psychosocial risk score at admission to increase risk of psychiatric rehospitalization. This study plans to use survival analysis to examine the influence of individual youth and family factors and greater social-ecological variables on ecological transition success, measured as time to youth psychiatric rehospitalization.

Rehospitalization as a Quality of Care Indicator

There is some debate regarding the implications of rehospitalization as an outcome. Lyons and colleagues (1997) discredit the use of rehospitalization as an indicator of quality of inpatient care. According to their study, readmission is not related to premature discharge, challenging the notion that managed care has produced a "quicker but sicker" approach to inpatient care. Rather, they suggest rehospitalization should be understood as a reflection of the course of mental illness, a representation of general admission policies (e.g., threshold for hospitalization), and an indicator of the quality of community-based services. Lyons et al. (1997) also asserts that preventing rehospitalization is not the goal of psychiatric inpatient care. They suggest that it is the responsibility of community care providers to prevent inpatient readmission and serve mental health needs in the community. Therefore, readmission is not a quality indicator of inpatient services (Lyons et al., 1997). Instead, it is an indirect measure of community tenure (Lyons, 1998) and an indication of the quality of community services (Lyons et al., 1997).

Thakur (1998) argues that the prevention of rehospitalization is not the responsibility of only community care providers, and suggests that the entire SOC, including inpatient providers, is charged with treating the patient and promoting

community-based placement. Thakur (1998) does not believe that the quality of inpatient services is unrelated to readmission rates; low-quality inpatient care can compromise the ability of patients to maintain community tenure and high-quality inpatient care can promote community tenure. Thakur (1998) suggests that rehospitalization provides a direct measure of the goal of patients living in the community and, therefore, an important outcome to examine.

Researchers agree that rehospitalization is best understood as a quality indicator of the system of care and that it provides a measure of community tenure, which is the goal of the SOC (Lyons, 1998; Lyons et al., 1997; Thakur, 1998). In the current study, an even wider net is cast, and rehospitalization is seen as a consequence of variables at all levels of the social ecosystem, all relevant stakeholders at these levels (provider and non-provider alike), and a range of possible interactions within and across subsystems. Therefore, this study aims to contribute to the rehospitalization literature by identifying variables that predict quicker rehospitalization from a social ecological perspective. The application of social ecological theory will allow this study to examine not only individual youth factors predicting rehospitalization, but also variables related to the greater system of care (e.g., use of community-based services) and other social ecological systems that the youth exists within (e.g., functioning of the family).

Summary and Current Study

Youth inpatient psychiatric hospitalization is considered the most restrictive treatment option on the continuum of mental health care within the greater system of care. The system of care philosophy promotes community-based care that is

individualized to the needs of the youth and family and is provided in the least restrictive environment possible (Stroul & Friedman, 1986). Former President George W. Bush's New Freedom Commission on Mental Health Care also echoes the system of care philosophy, stating that the goal of mental health care should be for people to be "able to live, work, and learn and participate fully in their communities (2003, p. 5). Therefore, inpatient psychiatric hospitalization should aim to psychiatrically stabilize youth, build skills that promote social and emotional functioning and management of stressors in their ecologies, and return youth to stable placements in the community.

Inpatient psychiatric care for youth transformed from a long-term mental health treatment option to an acute service used for brief and intensive crisis stabilization and psychiatric reconstitution (Bisnaire & Greenham, 2009; Blanz & Schmidt, 2000; Lyons, 2004; Romansky et al., 2003; Sharfstein, 2009). In its first phase, youth inpatient care served as a long-term, comprehensive, multidisciplinary mental health care treatment option. What was then considered inpatient care is now classified as residential treatment. The introduction of managed care, adoption of the system of care model, and creation of the CASSP in the 1980s ushered in the second phase of youth inpatient care. Under its current conceptualization, inpatient psychiatric hospitalization is a short-term, acute treatment option reserved for youth whose psychiatric symptoms cannot be adequately managed in the community, who are at risk of harming themselves or others, and are in need in need of crisis management. Inpatient care aims to provide psychiatric stabilization and facilitate the youth's return back to a community-based placement.

This shift in the inpatient treatment philosophy, moving from a long-term to brief treatment model, resulted in a reduction in the youth's length of stay in inpatient care. There is preliminary evidence that this reduction in length of stay resulted in an increase in the rate of youth psychiatric rehospitalization (Figueroa et al., 2004; Wickizer et al., 1999). The rising rate of inpatient rehospitalization, paired with the reduction in length of stay suggests that inpatient and community-based services may have become disconnected, "silo" services, rather than connected treatment modalities in the system of care's continuum of care, and that inpatient treatment is at risk of becoming a "revolving door" for youth with complex mental health care needs (Chung et al., 2008), as these treatment modalities in the continuum fail to adequately work together to serve the "whole child". Additionally, this inverse relationship between length of stay and rehospitalization rate highlights the importance of examining rehospitalization as a youth inpatient hospitalization outcome, as it represents a failure in the ecological transition out of the inpatient milieu.

The traditional dichotomous measurement of rehospitalization outcomes (i.e., rehospitalized or not) offers only a narrow view of treatment success. For youth with serious psychiatric issues, the transition from the highly structured and restrictive environment of the inpatient facility into the community is likely to be a tough one. Although inpatient care aims to return youth to community-base placement, treatment success, defined as no rehospitalization, may be too rigid for a population with such complex needs. Alternatively, inpatient treatment outcomes may be more appropriately assessed as time to rehospitalization, with longer time between hospitalizations as

indicative of a more successful transition, particularly for highly troubled youth. This study will use survival analysis to model time to psychiatric rehospitalization in an effort to better account for the often complex and relatively more severe psychiatric needs of youth in the child welfare system, who represent a prominent subgroup of youth who will be examined in this study.

There are a multitude of forces in the youth's environment that contribute to his/her functioning and that support or hinder the transition from inpatient care to community-based treatment. The influence of both individual youth and greater system factors (e.g., family, community) on the youth's development and functioning supports the application an ecological perspective to inpatient outcomes monitoring. This study will use an abridged version of the comprehensive Child and Adolescent Need and Strengths (CANS; Lyons, 1999) tool to assess individual youth needs and strengths, as well as the needs and strengths of other social ecological systems influencing the mental health of the child (e.g., family functioning, community). The CANS is consistent with the system of care's individualized care perspective and adopts a positive psychology approach by examining not only symptoms and risk factors, but also supportive variables. Although designed as an item-level tool, historically, the CANS has shown multiple scales that present an individualized profile of needs and strengths. This study will use confirmatory factor analysis (CFA) to evaluate two different a priori measurement models of an abridged version of the CANS: the five-factor conceptual model proposed by the author and a six-factor model based on Bronfenbrenner's social ecological theory. As an independent sample of inpatient hospitalized youth is not available to confirm the

factor structure of the CANS, two methods of exploratory factor analysis, principal-components analysis (PCA) and principal axis factoring (PAF), will be performed. The results of these exploratory factor analysis strategies will be compared to the results of the CFA in an effort to provide support for the proposed factor structure based on social ecological theory. Information from the CANS, as well as symptom severity at intake (as measured by the Acuity of Psychiatric Illness, Child/Adolescent version [CAPI; Lyons, 1998]), data on demographics, and treatment history, will be examined using survival analysis to determine the influence of different variables from the social ecological systems of the youth on time to rehospitalization.

Based on the previous literature examining predictors of time to youth psychiatric readmission and adopting a social ecological perspective, a number of variables at the individual youth level, family level, and greater social ecological system level are hypothesized to be associated with a reduced time to rehospitalization.

Hypotheses

Based on social ecological theory and the subscales suggested by the author of the CANS, two alternative models of the abbreviated CANS used for this study will be examined to specify the structure of this measure for a sample of youths served in a psychiatric inpatient hospital. First, a six-factor model based on social ecological theory (see Figure 1) will be analyzed. Then it will be compared with a conceptual five-factor model proposed by the author of the CANS (see Figure 2) and a global, one-factor model (see Figure 3) to determine the most appropriate structure of the measure.

1. The first hypothesis is that a measurement model consisting of six factors will provide good fit to the data (see Figure 1). The six factors will include: youth strengths (optimism, talents/interests, well-being), youth capacity (developmental/intellectual, physical, medical), youth emotional/behavioral needs (anger control, substance abuse, other self-harm, danger to others, fire setting, runaway, delinquency, judgment, affect dysregulation, somatization), traumatic stress symptoms (adjustment to trauma, re-experiencing trauma, avoidance, numbing, dissociation), family functioning (interpersonal, family strength, relationship permanence, family functioning, living situation, attachment difficulties), and greater social ecological system functioning (educational, spiritual/religious, community life, legal, school behavior, school achievement, school attendance). Results will be analyzed using confirmatory factor analysis (CFA). Maximum likelihood estimation with oblique and orthogonal rotations will be used to test the factor structure of this model. Specifically, it is hypothesized that:

   a. The six-factor model will provide a good fit to the data as determined by the goodness of fit indices. The root means square error of approximation (RMSEA) and standardized root mean square residual (SRMR) were used to

Figure 1. Child and Adolescent Needs and Strengths, six-factor, oblique model

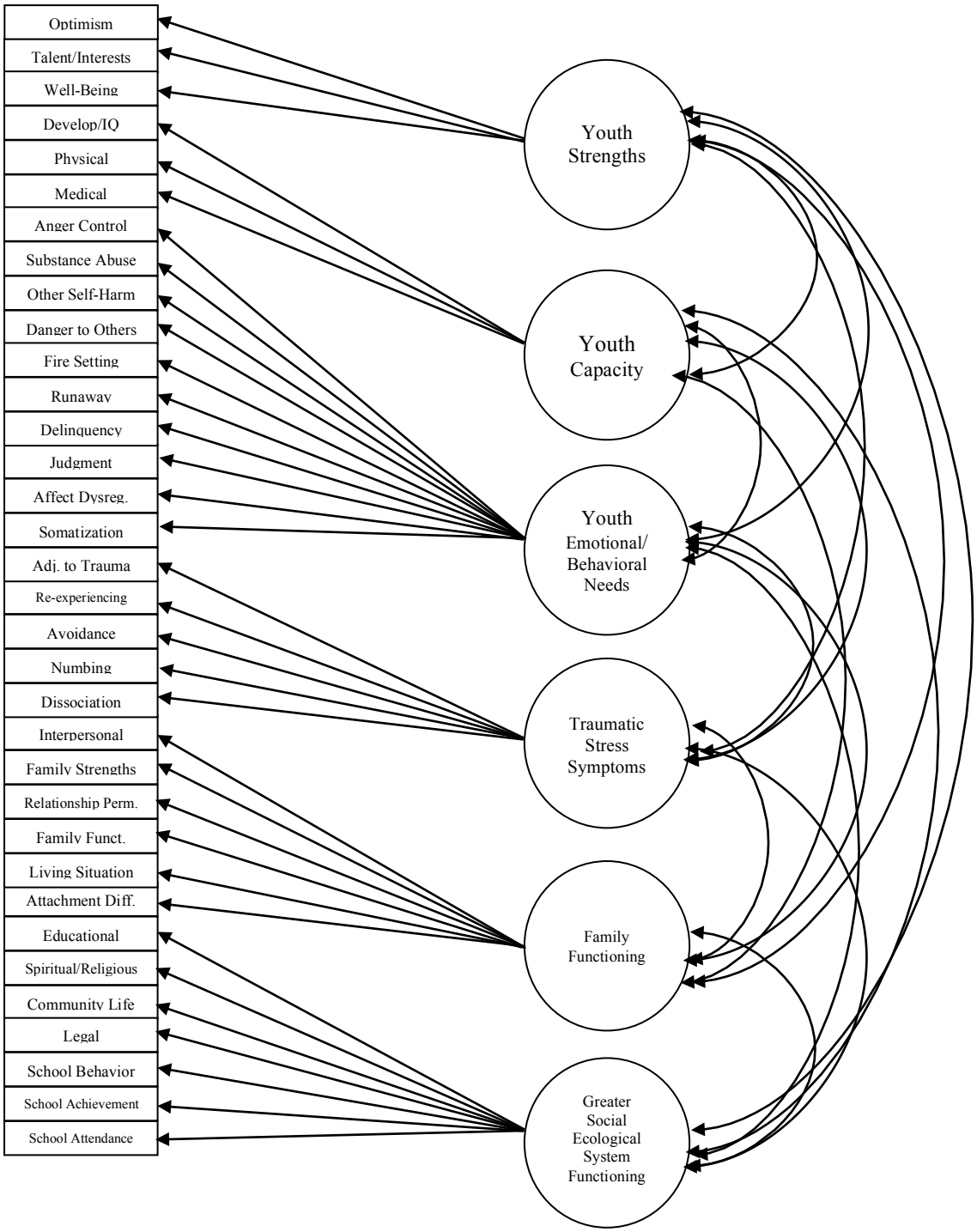


Figure 2. Child and Adolescent Needs and Strengths, five-factor model

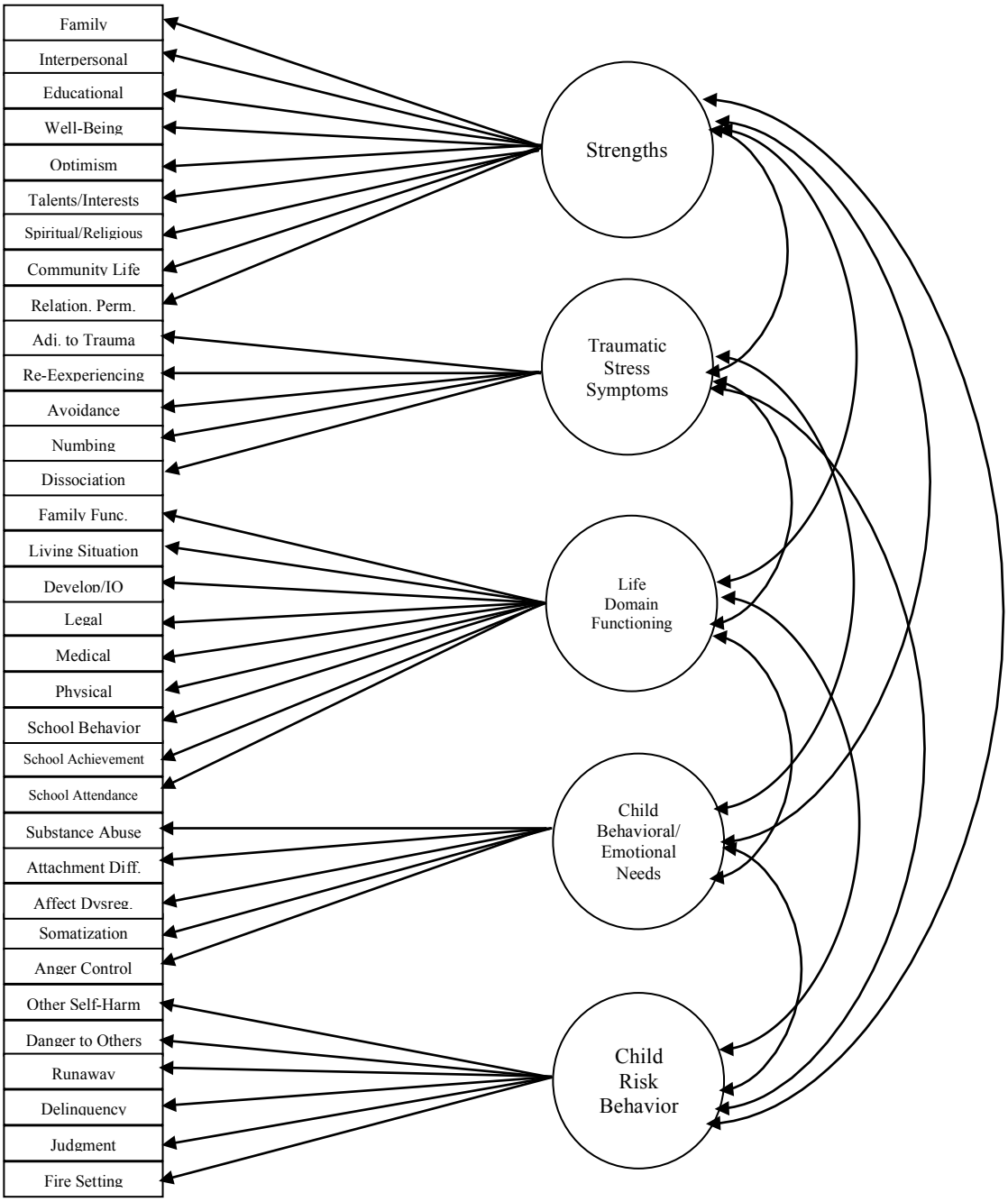
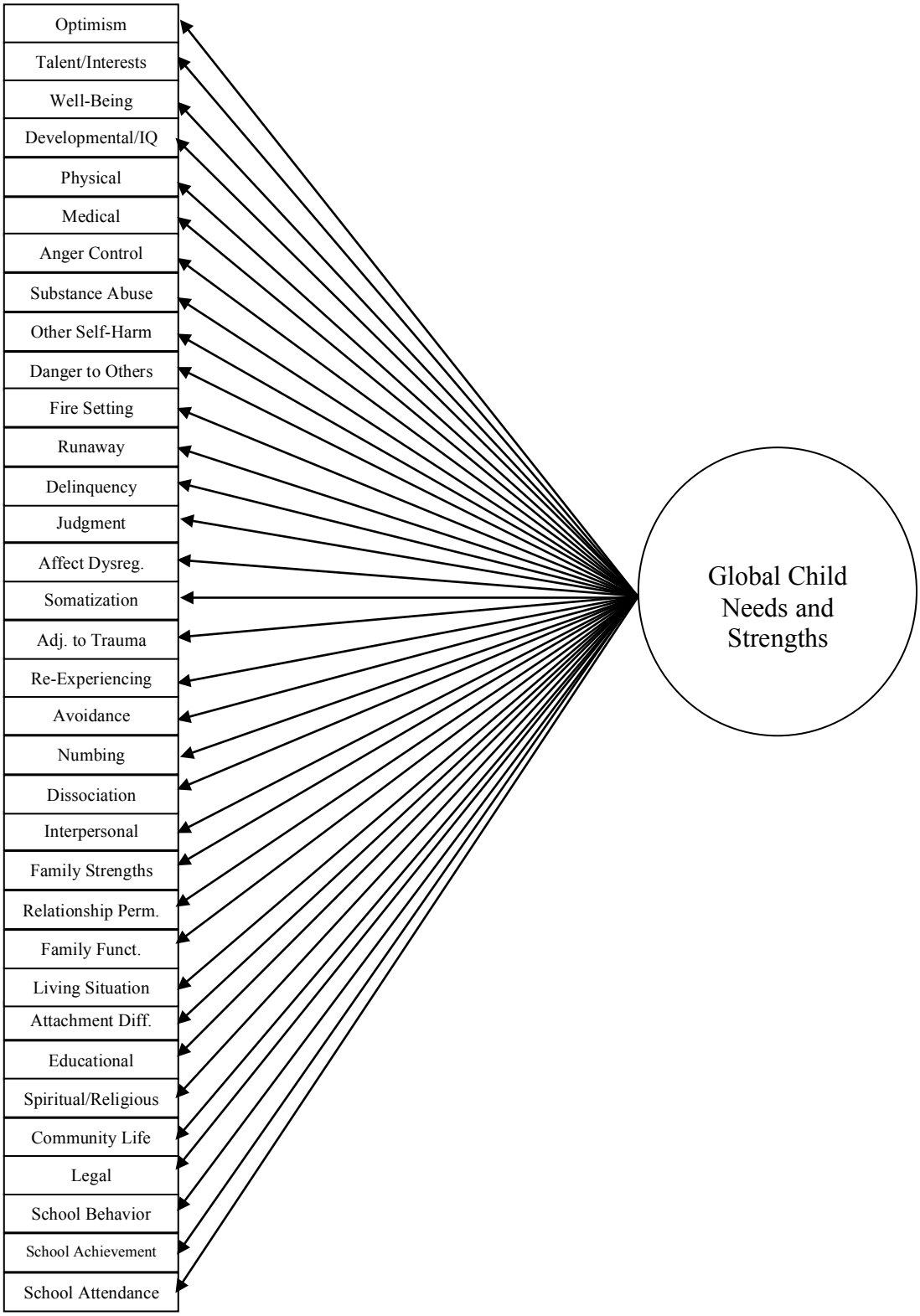


Figure 3. Child and Adolescent Needs and Strengths, global, one-factor model



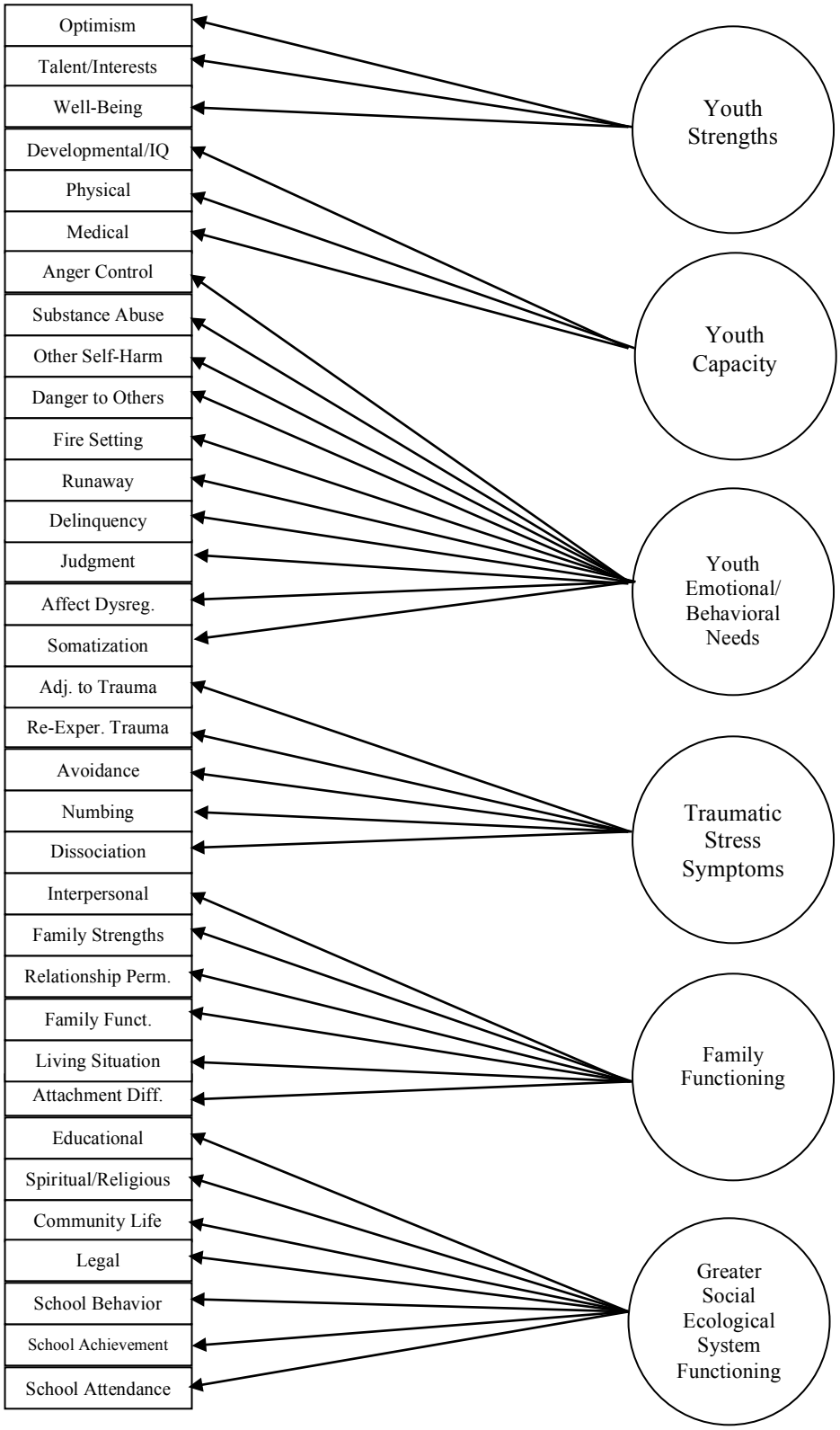
assess absolute fit. Values less than or equal to 0.08 are considered acceptable fit for absolute fit indices (Hu & Bentler, 1999). The comparative fit index (CFI) and non-normed fit index (NNFI) were used to assess relative fit. Values greater than 0.9 are deemed acceptable for all relative fit indices according to the criteria set forth by Marsh and colleagues (1988).

b. The six-factor model will provide a better fit to the data than a one-factor model (see Figure 3) as determined by a chi-square differences test.

c. The six-factor oblique model (see Figure 1) will provide a better fit to the data than a six-factor orthogonal model (see Figure 4) as determined by a chi-square differences test.

d. The six-factor model will provide a better fit to the data than the five-factor model proposed by the author of the CANS as determined by a chi-square differences test. The five factors proposed by the author of the CANS are as follows: strengths (family, interpersonal, educational, well-being, optimism, talents/interests, spiritual/religious, community life, relationship permanence), traumatic stress symptoms (adjustment to trauma, re-experiencing trauma, avoidance, numbing, dissociation), life domain functioning (family, living situation, developmental/intellectual, legal, medical, physical, school behavior, school achievement, school attendance), child behavioral/emotional needs (substance abuse, attachment difficulties, affect dysregulation, somatization, anger control), child risk behaviors (other self-harm, danger to others, runaway, delinquency, judgment, fire setting).

Figure 4. Child and Adolescent Needs and Strengths, six-factor, orthogonal model



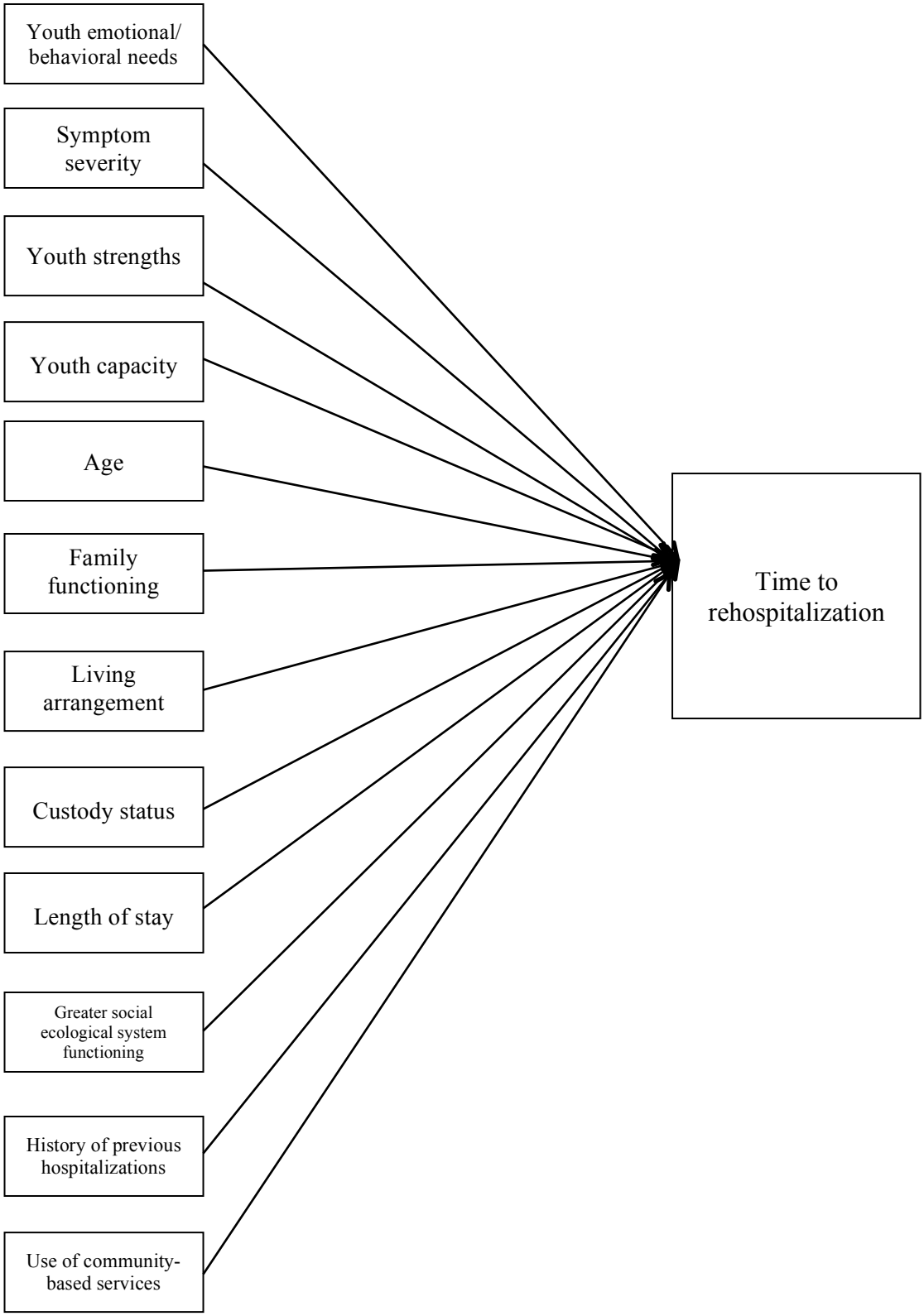
Since there is a limited literature base to guide the factor structure of the CANS and the author allows for flexibility in the tool creating many different customized and versions of the measure, this will be the first attempt to conduct a CFA on this particular abridged version of the CANS. Therefore, it is possible that the best fitting model may not be within adequate fit parameters (as measured by RMSEA, SRMR, CFI, and NNFI). If this is the case, model refinement using trimming will be used to find the best fitting model. Specifically, model refinement will focus on removing individual items that are inconsistent with the identified factors (i.e., negative factor loadings) and the overall measure. This will be determined by examining the squared multiple correlations of individual items. Additionally, principal components analysis (PCA) and principal axis factoring with various rotation and extraction methods will also be performed to support the factors found using CFA

2. The second hypothesis is that the three factor analysis strategies—CFA, PCA, and PAF—will converge with regard to the number of factors revealed and the items composing these factors.

3. The third hypothesis is that a number individual youth factors, family factors, and greater social ecological system factors will predict time to rehospitalization (see Figure 5). Results will be analyzed using survival analysis (Cox hazard modeling) with time to psychiatric rehospitalization as the outcome. Specifically, it is hypothesized that:

    a. The following individual youth factors will predict faster time to rehospitalization: high youth emotional/behavioral needs, high symptom

Figure 5. Proposed main effects



severity at intake, low youth strengths, low youth capacity, younger age at intake.

b. The following family system factors will predict faster time to rehospitalization: low family functioning, child welfare custody status, and non-biological parent living arrangement.

c. The following greater social ecological system factors will predict faster time to rehospitalization: low greater social ecological system functioning, greater history of previous inpatient hospitalizations, reduced LOS, less utilization of community-based mental health services.

4. The fourth hypothesis is that individual youth, family system, and greater social ecological system factors will interact to predict time to rehospitalization for subgroups of inpatient youth (see Figures 6-8). Again, results will be analyzed using survival analysis with time to rehospitalization as the outcome. The following interactions are hypothesized:

a. The latent variable family functioning will moderate the relationship between the latent variable youth emotional/behavioral needs and time to rehospitalization (see Figure 6), with high emotional/behavioral needs predicting quicker rehospitalization for youth with low family functioning.

b. The latent variable family functioning will moderate the relationship between age and time to rehospitalization (see Figure 7), with younger age predicting quicker rehospitalization for youth with high family functioning.

c. Child welfare status will moderate the relationship between the latent variable traumatic stress symptoms and time to rehospitalization (see Figure 8), with high symptoms of traumatic stress predicting faster time to rehospitalization for youth in the child welfare system

Figure 6. Proposed interaction between youth emotional/behavior needs and family functioning on time to rehospitalization

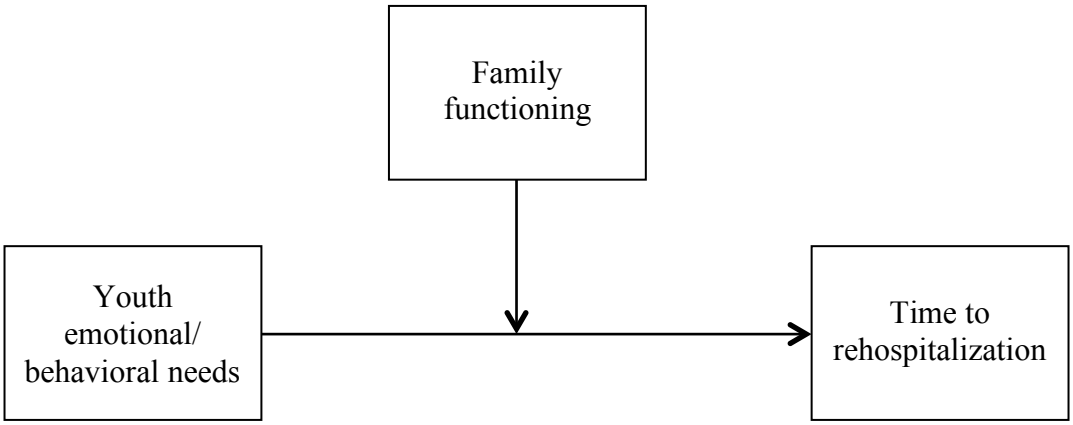


Figure 7. Proposed interaction between age and family functioning on time to rehospitalization

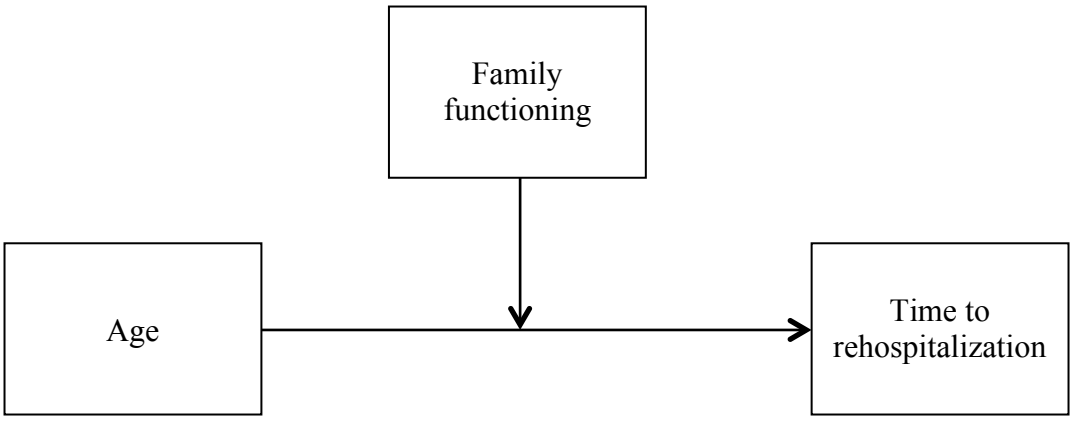
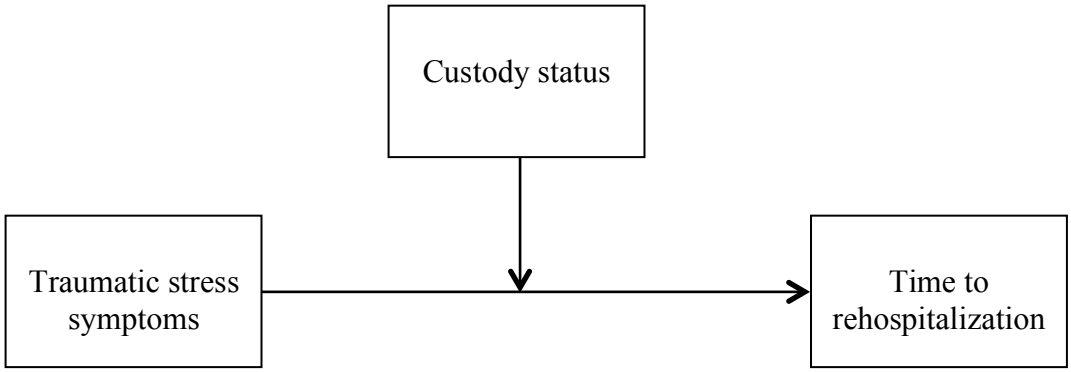


Figure 8. Proposed interaction between traumatic stress symptoms and custody status on time to rehospitalization



CHAPTER THREE

METHOD

Participants

The sample used for this study consists of 226 youth admitted to the Advanced Child Treatment (ACT) Unit at a private Midwestern psychiatric inpatient hospital between October 1, 2009, and October 1, 2010. The ACT Unit is a specialized inpatient treatment option for younger children (i.e., age 4 to 12) with a history of multiple inpatient hospitalizations designed to treat younger children in a developmentally appropriate service context. Psychiatric Solutions, Incorporated (PSI), a national, for-profit corporation specializing in inpatient services owns the hospital. Youth who did and did not experience a readmission to the inpatient unit were also included in this study. Some youth were readmitted more than once during the data collection period. For this subsample only information pertaining to their first readmission was included in this study.

All youth were between the ages of 4 and 12 years old, with a mean age of 8.71 years *(*SD=1.95) at initial consent. Approximately 62 percent of the sample was male and 38% was female. On average, youth experienced 1.36 (*SD*=1.51) previous hospitalizations at the study hospital and 0.93 (*SD*=1.29) previous hospitalizations at other psychiatric facilities and were utilizing 1.74 (*SD*=1.06) community-based services

(e.g., medication management, individual therapy) prior to admission. The rehospitalization rate of the sample was 26.1%. With regard to custody status, biological parents had custody of 61.4% of youth, 14.2% of youth were adopted, and 24.4% of youth were in the child welfare system. The majority of youth resided with a biological parent prior to admission (76.7%). Of youth not residing with their biological parent, 18.4% lived in non-relative foster care homes and 3.9% were placed in foster care with a relative. One youth in the sample was homeless at intake.

Materials

Child and Adolescent Needs and Strengths

Youth inpatient hospitalization outcomes were evaluated using an abridged version of the comprehensive Child and Adolescent Needs and Strengths (CANS; Lyons, 1999). This assessment tool was developed to guide service delivery for children with emotional and behavioral healthcare needs. The CANS instrument unifies the clinical and strengths perspective into a single approach (Lyons, 2009). It assesses the symptoms, risk factors, and functioning of a child or adolescent across multiple domains and is used as an assessment, decision-support and outcome measure instrument (State of Illinois DCFS, 2009). In order to become a certified CANS rater, staff must achieve a reliability of 85% rating accuracy on a practice clinical vignette. This has translated into acceptable reliability statistics (see below) that remain stable over time in subsequent chart audits. The CANS was completed by Master's level, direct services workers at intake and discharge for all youths served on the acute inpatient unit.

The CANS divides its 57 dimension across six domains: life domain functioning,

youth strengths, acculturation, caregiver needs and strengths, youth behavioral/emotional needs, youth risk behaviors. In addition to these six domains, there are eight modules to be used when critical items are endorsed. CANS modules include: developmental needs, substance use, trauma, violence, sexually abusive behavior, runaway, juvenile justice, and fire setting. Severity ratings are reported along a four-point Likert scale, from 0 to 3. The items are action-oriented in regards to their structure to allow for greater communication during service planning (Lyons, 2009). Across all dimensions, a score of 0 indicates no evidence or reason to believe that the rated item requires any action, a 1 indicates a need for watchful waiting, monitoring or possibly preventative action, a 2 indicates a need for action and the implementation of some strategy to address the problem or need, and a 3 indicates a need for immediate or intensive action and specifies an immediate safety concern or a priority for investigation. A fifth response option, "unknown" was also included in the modified CANS used for the present study. This option was used when an accurate assessment of functioning could not be made and served as an indicator that more information was needed for that particular item. The Comprehensive CANS manual provides a detailed description of what each numerical rating constitutes for the specific dimension items (see Appendix A).

The CANS has consistently been shown to be a reliable and valid assessment tool (Anderson, Lyons, Giles, Price, & Estle, 2003; Lyons, 1999). The CANS ratings reliably correlate with clinical vignettes as the source of ratings (kappa=0.74), with case records and current cases as the source of ratings (kappa=0.85) and with individual items (kappa=0.73) (Lyons, 2004). The CANS is significantly correlated with an

independently assessed Child and Adolescent Functional Assessment Scale (CAFAS), with the CANS factor significantly correlated with an independent measure of burden from the CAFAS, providing evidence for its use as an assessment tool (Hodges, Kline, Stern, Cytryn, & McKnew, 1982; Rautkis & Hdalio, 2001). As a decision-support tool, the CANS has been found to correlate with expert clinical judgment. In a comparison study evaluating the clinical judgment ability of the CANS against professionals in Multnomah County, OR, the CANS informed level-of-care criteria agreed with the expert panel decision 91% of the time (Lyons, 2004). It has also been found to distinguish the needs of children in rural and urban settings (Anderson et al., 2003). Shown to be sensitive to change, the CANS is a useful outcome measurement instrument.

An abridged version of the CANS was used for this study (see Appendix B). The staff found the full 57-item measure to be too laborious for clinicians to complete for all youths on the unit. In addition to concerns regarding the measure being too time intensive, researchers and staff found certain items to be irrelevant to the sample population (e.g., job functioning item for a sample of four to 12 year olds) and others to be assessed by other measurement tools (e.g., the majority of the items in the domain of youth behavioral/emotional needs are covered on the CAPI). Items from the trauma module were also included in the abridged version of the CANS as there is a significant group of youth in the child welfare system served on the unit and entry into child welfare is contingent on the experience of a traumatic event (e.g., abuse or neglect). Additionally, the experience of being in the child welfare system can be traumatic in it of itself. Entry into care, disruption of education and mental health services, multiple foster

home placements, and abuse within the system all contribute to the experience of trauma for youths in child welfare (Benedict, Zuravin, Somerfield, & Brandt, 1996; Newton et al., 2000). The 34 items chosen for the abridged version of the CANS used for this study were selected due to their relevancy to the population under investigation and uniqueness, when taking into account the other measures and demographic information obtained. This study uses the CANS to assess broad symptom, functioning, and ecological system factors at the beginning and end of the episode of care (i.e., intake and discharge) and to determine (in part) the needs of the youth and family at discharge to assist with treatment planning.

Acuity of Psychiatric Illness—Child/Adolescent Version

The measure of psychiatric symptom acuity used in this study to evaluate outcomes was the Acuity of Psychiatric Illness—Child/Adolescent version (CAPI; Lyons, 1998; see Appendix C). The CAPI consists of 17 items rated across three domains: risk behaviors (e.g., suicidal ideation or gesture, aggressive behavior toward people), symptoms (e.g., reality assessment, anxiety, noncompliance), and functioning (e.g., peer functioning, self-care functioning). Each item is rated on a 0-3 scale ("0" = no evidence of acuity, "1" = mild acuity, "2"= moderate acuity, "3"= severe acuity), and the items are rated based on the past 24 hours. For example, a score of zero on the CAPI self-mutilation behavior item would indicate that the child did not engage in self-mutilation over the past 24 hours on the milieu beyond normative behaviors such as nail biting or drawing on the skin. At the extreme, a "3" rating on the self-mutilation behavior

item would indicate behavior with potentially significant medical risk such as head banging, self-biting, or cutting.

Prior research has found that both the adult and child versions of the Acuity of Psychiatric Illness measures are reliable and sensitive to change over small periods of time, (see Lyons, 2004 and Lyons et al., 1997). The alpha reliability of the CAPI as a composite measure of acuity was .80, in the acceptable range. For this study, a total CAPI score from the first CAPI administered (i.e., intake) will be used as a measure of potential future psychiatric symptom acuity, suggesting how severe the symptomatology of the youth can become.

The CAPI was completed by milieu therapists and psychiatric nurses at the end of each weekday shift. The clinicians completed CAPI ratings based on their experience with the youth that day and after reviewing shift notes spanning the 24-hour period in which the CAPI was rated. Staff members were required to complete a two-hour training in the use of the CAPI, which included rating practice vignettes and discussing actual cases. Staff members then completed a certification vignette and were required to be 85% accurate in their ratings to receive certification. This led to an overall Kappa reliability of .80 across the trainings. Reliability was further ensured through ongoing chart reviews. The primary author and quality assurance staff rated a sub-sample of existing charts and provided feedback to staff about their reliability. Staff were awarded incentives of $15.00 gift cards for demonstrating accuracies of 80% or higher. A Kappa reliability of .75 was maintained throughout the study. This study uses the CAPI to

measure outcomes of the episode of care and to look at daily psychiatric acuity changes during hospitalization.

Procedure

A pilot study was conducted between August 2009 and October 2009 to ensure feasibility and measurement reliability. Data collection for this study began on October 1, 2009 and ended on October 1, 2010. Participants were recruited upon intake to the ACT Unit at the psychiatric inpatient hospital (see Table 1 for hospitalization procedures). Parents or legal guardians were informed that the study would measure changes in the psychiatric acuity their child was experiencing on the unit in order to

Table 1. Hospitalization procedure

Phase of episode of care	Form/measure	Administered by
Admission	Consent	Clinical social worker
Intake	Comprehensive entry assessment	Clinical social worker
	Intake Information Form	Clinical social worker
	CANS	Clinical social worker
During Hospitalization	CAPI	Milieu therapists and psychiatric nurses
Discharge	CANS	Clinical social worker
Two-weeks post-discharge	Follow-up interview	Master's level outreach coordinators

monitor hospital outcomes and promote quality improvement. Parents or legal guardians who agreed to participate signed an informed consent form approved by the IRB at

Loyola University Chicago (see Appendix D). Participants who were wards of the state received consent from the Guardian's office. Over 95% of potential subjects agreed to participate in the study.

Demographic information was collected by parents/guardians through their completion of a comprehensive entry assessment. Information regarding treatment history was also collected by a clinical social worker at intake by documenting the number of previous hospitalizations at the hospital as well as at other inpatient psychiatric facilities. A clinical social worker completed an Intake Information Form (see Appendix E) for each youth entering the ACT Unit at intake and the CANS at both intake and discharge. Milieu therapists and psychiatric nurses completed the CAPI at the end of each weekday shift of the youth's episode of care.

While on the ACT unit, youth received 30 minutes of individual therapy two times per week, mandated family therapy one time per week (if there was a family involved in care), and participate in a social therapy group four times per week. Many youth also received special orders for expressive therapy. In addition to formal therapy, daily programming on the ACT unit includes movement games/skill building, art, academics, play/recess, hygiene, and eating periods. Discharge decisions were made by the assigned psychiatrist. Discharge criteria included the youth's treatment history, treatment goals, and post-discharge placement. Youth must have demonstrated no recent aggressive or self-injurious behaviors or be actively psychotic to be considered for discharge. The youth must also be tolerating medication changes, if applicable. Finally,

the family/care system must have scheduled aftercare appointments (e.g., individual therapy, medication management) prior to discharge.

Two weeks after discharge from the hospital, Master's level outreach coordinators conducted follow-up interviews with parents/guardians either in-person or over the phone. During these interviews staff members collected information regarding the use of post-discharge services and provided instrumental and emotional support for parents/guardians encountering barriers to implementing discharge recommendations. The same process was repeated for youths who were rehospitalized during the data collection period.

Missing Data

Two separate approaches were utilized for handling missing data. The listwise deletion technique was used for all cases including an "unknown" rating for any of the CANS items and for those cases where more than a quarter of the items were missing data (i.e., more than 9 items with missing data). This procedure reduced the original sample size of 226 youth to 213. The maximum likelihood approach using PRELIS was used to address missing data. This missing data imputation approach was used to minimize modifications and allow for randomness and variability in the imputed data (Kline, 2011).

Statistical procedure

Factor Structure of the CANS

The factor structure of the abridged version of the CANS will be examined using confirmatory factor analysis (CFA), using LISREL 8.8 (Jöreskog & Sörbom, 2006) and

the approach described by Bryant and Baxter (1997). Chi-squared values and indices of absolute and relative fit will be used to examine the fit of contrasting models. The root means square error of approximation (RMSEA) and standardized root mean square residual (SRMR) will be used to assess absolute fit and the comparative fit index (CFI) and non-normed fit index (NNFI) will be used to assess relative fit. According to Hu and Bentler (1999) absolute fit indices, values between less than or equal to 0.08 are considered "acceptable fit." Values greater than 0.9 are deemed acceptable for all relative fit indices according to the criteria set forth by Marsh and colleagues (1988). The fit of the following models will be compared (see Figures 1, 2, 3, and 4): (a) a six-factor oblique model based on social ecological theory that allows the latent variables to correlate, (b) a six-factor orthogonal model, again, based on a social ecological theory, that does not allow the latent variables to correlate, (c) a global-one factor model, and (d) a five-factor oblique model proposed by the author of the CANS that allows the latent variables to correlate.

A large sample size is required to perform a CFA. Floyd and Widaman (1995) suggest a sample size large enough that five to ten participants are included per estimated parameter in the CFA model. The six-factor oblique CANS model based on social ecological theory has the most estimated parameters of the models being compared. There are 83 estimated parameters in all. Therefore, a sample size of at least 415 is needed to run the CFA, using the criteria of five participants per estimated parameter.

Exploratory factor extraction approaches. Due to the low power of this study (i.e., the sample size of this study is 213, which provides only 2.57 participants per estimated parameter, which is only about 51% of the recommended minimum suggested by Floyd and Widaman) and the absence of an available independent sample to confirm the results of the CFA, two alternative, exploratory factor extraction methods will be performed using SPSS 18.0 and the results of these methods will be compared to the CFA with regard to the number, interrelations, and content of the various factors. The two exploratory factor analysis methods used are principal components analysis (PCA) and principal axis factoring (PAF). The assumptions of these exploratory factor extraction approaches are different than that of CFA.

In PCA, the primary assumption is that the total variance of a variable is equal to the sum of the explained and error variance (Hotelling, 1933; Pearson, 1901). It assumes that the scores on measured variables have perfect reliability (Thompson, 2004). The goal of PCA is to identify the smallest number of factors that account for the total variance in the correlation matrix of the original items (Bryant & Yarnold, 1995). To accomplish this goal PCA attempts to recreate the variance in the sample data, not that of the greater population. Therefore, only if the sample data is representative of population data will the sample factors match those of the population. PCA uses 1.0's on the diagonal of the correlation matrix, suggesting that scores on a particular measured variable correlate perfectly with the same score on that measured variable; however, this is not the case if scores are not perfectly reliable (Gorsuch, 1974; Thompson, 2004). Measurement error is not taken into PCA.

In PAF, communality coefficients are used in the diagonal of the correlation matrix. This extraction method often begins with PCA and then the communality coefficients from PCA are used to replace the ones on the diagonal of the initial correlation matrix (Gorsuch, 1974; Thompson, 2004). A set of factors and corresponding communality coefficients are then extracted. This process continues until the communality estimates stabilize, which is known as iteration. If the iteration process does not converge then often the sample size is too low for the number of measured variables and estimated model. In PAF, the variance of each item is assumed to be both item communality and unique item variance.

The only difference between these two extraction methods is that PCA uses 1.0's in the diagonal correlation matrix and PAF uses communality estimates in the diagonal of the correlation matrix that are iteratively estimated until convergence (Gorsuch, 1974). There are two factors that affect the convergence of factors obtained by PCA and principal axis factoring: item reliability and number of measured variables being analyzed. First, if item reliability is high (i.e., approaching 1.0), then these two methods will be more equivalent as PCA uses 1.0 in the diagonal of the correlation matrix. Second, as the numbers of measured variables increase, the ratio of diagonal to off-diagonal elements decrease and PCA and PAF tend to be more similar (Ogasawara, 2000).

Methods of rotation. Factor rotation involves the process of moving the factor axes that measure the location of the measured variables in the factor space in order to illuminate the nature of the underlying constructs for the researcher and obtain simple

structure (Thompson, 2004). Simple structure is defined by the following three properties according to Thurstone (1947): (a) each variable should have at least one loading near zero on at least one of the factors, (b) for each factor there should be at least as many variables with near-zero loadings as number of factors, and (c) for each pair of factors there should be at least a few variables that load onto only one variable. Overall, variables should be high loaders (i.e., 0.4 and above in the rotated components matrix) on a single factor (Bryant & Yarnold, 1995).

Simple structure is achieved by applying appropriate rotation methods. First, oblique rotation methods will be employed in an attempt to reach simple structure since it is hypothesized that the components of the CANS are interrelated. Two popular oblique rotation methods include promax rotation and oblimin rotation. Promax rotation is actually a series of rotations that alters an initial orthogonal rotation to produce an oblique solution (Gorsuch, 1974). Following the initial rotation, the pattern/structure coefficients are raised to an exponential power (known as the pivot power), making each coefficient closer to zero, but also creating a larger differential between coefficients. The promax solution is obtained by a final Procrustean rotation, which targets the varimax pattern/structure coefficients raised to the pivot power. Alternatively, oblimin rotation controls the degree of correlation among rotated factors with a value called delta (Thompson, 2004). Highly correlated factors are created by delta values of zero and more uncorrelated factors are created by large negative delta values. Experts suggest the use of promax rotation due to its speed in reaching a solution and its ability to maximize simple structure by clarifying the items that do and do not correlate with each component

(Gorsuch, 1983; Norman & Streiner, 2008; Tabachnick & Fidell, 2007), therefore, although both promax and oblimin rotation methods will be used, preference will be given to the results rendered using promax rotation. The factor correlation matrix will be examined to determine if oblique rotation methods are appropriate. If correlations between extracted factors are equal to or exceed 0.32 then there is at least 10% of variance shared amongst factors, supporting the use of oblique rotation methods (Field, 2009; Tabachnick & Fidell, 2007).

If oblique rotation methods do not demonstrate a significant correlation between the extracted factors then orthogonal rotation methods will be used in an attempt to achieve simple structure. Orthogonal rotation leaves factors uncorrelated. Two orthogonal rotation methods will be used to attempt to yield simple structure: varimax rotation and quartimax rotation. Varimax rotation is the standard default rotation in most statistical packages. This orthogonal rotation method maximizes differences between the squared pattern or structure coefficients of a factor, utilizing a column approach (Gorsuch, 1974; Thompson, 2004). Alternatively, quartimax rotation uses a row approach to attaining simple structure by maximizing differences of variables across factors. Quartimax rotation tends to produce a single, general factor (Gorsuch, 1974).

Strategies for determining the number of underlying factors. Three stopping rules will be employed to determine the appropriate number of factors from the results of the PCA and PAF: the Kaiser (1960) stopping rule, Cattell's (1966) scree test, and parallel analysis (Horn, 1965). The Kaiser rule retains all factors with eigenvalues of at least 1, which is the variance of a single standardized variable (Bryant & Yarnold, 1995).

Due to the fact that an eigenvalue of one means different things depending on the number of variables, Kaiser's criterion often overestimates the number of factors to retain, particularly when there are more than 30 variables, as is the case with the CANS (Field, 2009). Cattell's scree test determines the appropriate number of factors to extract by plotting the eigenvalues (Y axis) by factor (X axis). The factors prior to the point of inflexion on the curve of the scree plot are kept and those in the gradual descent are dropped (Bryant & Yarnold, 1995). Parallel analysis is the most complex of the three methods in determining how many factors to retain. This process first creates a randomly generated data set with the same number of cases and variables as the raw data. Then the exploratory factor analysis technique is repeatedly performed, each analysis rendering an eigenvalue. The eigenvalues derived from the analyses are then averaged for each component and compared to that found using the original raw data set. Components with larger eigenvalues than the randomly generated data are retained (Field, 2009; Tabachnik & Fidell, 2007). These three techniques will be used in combination to determine the number of factors to retain, with preference given to the results of parallel analysis due to its consideration of the characteristics of the data being analyzed.

EFA within the CFA framework. If there is no consensus between the exploratory and confirmatory factor analysis methods with regard to the number of factors and items comprising these factors, "exploratory factor analysis within the CFA framework" (E/CFA; Joreskog, 1969; Joreskog & Sorbom, 1979) will be used. E/CFA allows for a more thorough and nuanced exploration of the measurement structure by examining not only the magnitude of factor loadings, as is the case with maximum

likelihood EFA, but also the statistical significance of cross-loadings and error covariances (Brown, 2006). E/CFA requires the number of factors to retain be identified. The results of the parallel analysis will be used to indicate the number of factors to retain. Additionally, in E/CFA an anchor item is selected for each factor. The cross-loadings of these anchor items are fixed at zero and the loadings of all other non-anchor items are freely estimated on all factors (Brown, 2006). Results of the EFA approaches will be used to select the anchor items for each proposed factor.

Identifying Predictors of Rehospitalization

This study will use survival analysis to examine the relationship between time to psychiatric rehospitalization and a set of individual youth and greater social ecological system predictors. Survival analysis is an appropriate statistical approach as it not only models the rate to an event (e.g., rehospitalization), but also identifies the factors influencing the manifestation of that event (Singer & Willett, 2003). Additionally, this method of analysis has the advantage of allowing the inclusion and analysis of cases that do not experience the event during the data collection period (i.e., censored cases), which is particularly relevant to this study as not all youth in the study experienced readmission to the inpatient unit during the study period. Further, survival analysis does not make the assumption that these youth never experience rehospitalization; rather it merely identifies these cases as censored and not experiencing the event during the study period.

Specifically, the Cox hazard model will be used. This approach models time to the event as a log-linear function of predictors, known as covariates (Singer & Willett, 2003; Tabachnick & Fidell, 2007). The relative effect of each covariate on the event is

represented by the regression coefficients. Although there are no assumptions regarding the shape of the survival distribution or nature of the distribution of the covariates, Cox modeling does assume that the impact of covariates on the event is constant across time, covariates have an additive impact on one scale (James et al., 2010), censored and non-censored cases do not vary systematically, and the shape of the survival function over time is the same for all cases (Singer & Willett, 2003; Tabachnick & Fidell, 2007).

Cox modeling explores the relationship between the hazard rate (i.e., likelihood of psychiatric readmission at a point in time) and a set of covariates (Singer & Willett, 2003). Individual youth (sex, age, total CANS score, CAPI score at intake), family system (living arrangement, custody status), and greater social ecological system (history of previous hospitalizations, length of stay, use of community-based services) variables, as well as scores on the latent variables of the CANS revealed in the CFA, exploratory factor analysis, and E/CFA methods are the covariates for this study. The proposed latent variables of the CANS also fall into the categories of individual youth, family system, and greater social ecological system factors with youth emotional/behavioral needs, youth strengths, youth capacity, and traumatic stress symptoms being classified as individual youth characteristics, family functioning classified as a family system characteristic, and greater social ecological system functioning classified as a greater social ecological system characteristic. Two-way interaction terms will also be included in the survival analysis to test hypotheses related to the interaction of different factors the various ecologies of youth that influence time to rehospitalization. The following

interaction terms will be added: youth emotional/behavioral needs x family functioning, age x family functioning, and traumatic stress symptoms x custody status.

CHAPTER FOUR

RESULTS

Descriptive Statistics

Descriptive data for the sample are presented in Table 2. Overall, 194 youth were included in the analyses. Youth ranged in age from 4 to 12 years old, with a mean age of 8.83 years (SD=1.93), and males comprised 67.7% of the sample. The majority of youth had a history of previous psychiatric hospitalizations—on average, youth experienced 1.54 (*SD*=1.52) previous hospitalizations at the study facility and 0.87 (*SD*=1.24) previous hospitalizations at another facility—prior to admission. However, it is important to note that parents/guardians could only list up to five previous hospitalizations on the intake form (i.e., up to five hospitalizations at the study facility and up to five hospitalizations at other facilities). Therefore, the descriptives presented here likely underestimate the extent of this sample's hospitalization history. Prior to admission to the facility, youth were utilizing between 0 and 4 (*M*=1.80, SD=1.02) community-based services (e.g., medication management, individual therapy). Highest score on the CAPI was used a proxy of symptom severity during the episode of care. The range of possible CAPI score is 0 to 51. Highest scores in this sample ranged from 0 to 25 (*M*=9.56, SD=5.91). Length of hospitalization ranged between 2 and 96 days

Table 2. Descriptive statistics for sample (N=194)

	Total sample		Not rehospitalized		Rehospitalized	
Variable	Mean (*SD*)	Range	Mean (*SD*)	Range	Mean (*SD*)	Range
Age	8.83 *(1.93)*	4-12	8.65 (*1.95*)	4-11	9.05 (*1.88*)	5-12
Number of previous hospitalizations (study hospital)*	1.54 *(1.52)*	0-5+	1.23 (*1.48*)	0-5+	1.90 (*1.51*)	0-5+
Number of previous hospitalizations (other)	0.87 *(1.24)*	0-5+	0.86 (*1.18*)	0-5+	0.88 (*1.33*)	0-5+
Number of community-based services used prior to admission	1.80 *(1.02)*	0-4	1.75 (*0.96*)	0-4	1.86 (*1.08*)	0-4
Length of stay (days)	20.93 *(16.17)*	2-96	20.18 (*16.40*)	2-96	22.13 (*15.90*)	2-88
Highest CAPI	9.56 *(5.91)*	0-25	9.60 (*5.94*)	0-25	9.50 (*5.91*)	0-21
CANS						
Youth Strengths						
Optimism	1.69 *(0.56)*	0-3	1.63 (*0.56*)	0-3	1.79 (*0.54*)	1-3
Talents/Interests	1.82 *(0.70)*	0-3	1.86 (*0.68*)	0-3	1.76 (*0.72*)	0-3
Well-being	1.85 *(0.36)*	1-2	1.85 (*0.36*)	1-2	1.83 (*0.38*)	1-2
Youth Capacity						
Developmental/IQ	0.29 *(0.58)*	0-3	0.32 (*0.61*)	0-3	0.23 (*0.49*)	0-2
Physical	0.07 *(0.32)*	0-2	0.055 (*0.29*)	0-2	0.091 (*0.38*)	0-2
Medical	0.29 *(0.52)*	0-2	0.29 (*0.53*)	0-2	0.30 (*0.50*)	0-2
Youth Emotional/Behavioral Needs						
Anger control	1.57 *(0.64)*	0-3	1.53 (*0.66*)	0-3	1.64 (*0.60*)	0-3
Other self-harm	0.53 *(0.66)*	0-3	0.48 (*0.63*)	0-3	0.61 (*0.72*)	0-3
Substance abuse	0.01 *(0.10)*	0-1	0.01 (*0.09*)	0-1	0.02 (*0.12*)	0-1
Danger to others	1.57 *(0.55)*	0-3	1.57 (*0.54*)	0-3	1.56 (*0.56*)	0-2
Fire setting	0.15 *(0.48)*	0-3	0.11 (*0.40*)	0-2	0.23 (*0.60*)	0-3

Runaway	0.55 *(0.73)*	0-2	0.48 (*0.71*)	0-2	0.67 (*0.77*)	0-2
Delinquency	0.12 *(0.39)*	0-2	0.14 (*0.41*)	0-2	0.091 (*0.34*)	0-2
Judgment	1.22 *(0.87)*	0-3	1.18 (*0.88*)	0-3	1.30 (*0.86*)	0-3
Affect dysregulation	1.48 *(0.59)*	0-3	1.46 (*0.57*)	0-3	1.53 (*0.61*)	0-3
Somatization	0.09 *(0.28)*	0-1	0.086 (*0.28*)	0-1	0.091 (*0.29*)	0-1
Traumatic Stress Symptoms						
Adjustment to trauma	0.92 *(0.85)*	0-3	0.90 (*0.89*)	0-3	0.95 (*0.79*)	0-3
Re-experiencing trauma	0.62 *(0.79)*	0-3	0.64 (*0.82*)	0-3	0.59 (*0.72*)	0-2
Avoidance	0.41 *(0.62)*	0-3	0.39 (*0.62*)	0-2	0.44 (*0.64*)	0-3
Numbing	0.32 *(0.53)*	0-2	0.33 (*0.55*)	0-2	0.30 (*0.50*)	0-2
Dissociation	0.07 *(0.32)*	0-3	0.055 (*0.32*)	0-3	0.091 (*0.34*)	0-2
Family functioning						
Interpersonal	1.81 *(0.50)*	0-3	1.82 (*0.49*)	1-3	1.79 (*0.51*)	0-3
Family strengths	1.61 *(0.66)*	0-3	1.63 (*0.72*)	0-3	1.56 (*0.53*)	1-3
Relationship permanence	1.57 *(0.70)*	0-3	1.57 (*0.75*)	0-3	1.58 (*0.61*)	0-3
Family functioning	1.72 *(0.61)*	1-3	1.71 (*0.63*)	1-3	1.73 (*0.57*)	1-3
Living situation	1.69 *(0.61)*	1-3	1.70 (*0.64*)	1-3	1.67 (*0.54*)	1-3
Attachment difficulties	0.64 *(0.83)*	0-3	0.63 (*0.86*)	0-3	0.65 (*0.77*)	0-3
Greater social ecological system functioning						
Educational	1.29 *(0.66)*	0-3	1.30 (*0.67*)	0-3	1.27 (*0.64*)	0-3
Spiritual/religious	2.08 *(0.93)*	0-3	2.10 (*0.95*)	0-3	2.03 (*0.89*)	0-3
Community life	1.71 *(0.49)*	0-3	1.73 (*0.49*)	0-3	1.67 (*0.48*)	1-2
Legal	0.12 *(0.43)*	0-3	0.13 (*0.45*)	0-3	0.11 (*0.40*)	0-2
School behavior	1.40 *(0.78)*	0-3	1.41 (*0.79*)	0-3	1.38 (*0.76*)	0-3
School achievement	0.85 *(0.71)*	0-3	0.88 (*0.71*)	0-3	0.79 (*0.71*)	0-3
School attendance	0.16 *(0.52)*	0-3	0.15 (*0.50*)	0-3	0.20 (*0.56*)	0-3

Note. Independent samples *t*-tests were run to examine differences in descriptive data between youth who experienced psychiatric rehospitalization and those who did not. CAPI=Acuity of Psychiatric Illness, Child and Adolescent Version, CANS=Child and Adolescent Needs and Strengths. *=$p<0.05$

	Total sample		Not rehospitalized		Rehospitalized	
Variable	*N*	Valid Percent of Sample	*N*	Valid Percent of Sample	*N*	Valid Percent of Sample
Gender						
Male	86	67.7	49	71.0	37	63.8
Female	41	32.3	20	29.0	21	36.2
Custody status*						
Biological parent	78	65.0	38	61.3	40	69.0
Child welfare	23	19.2	17	27.4	6	10.3
Adopted	19	15.8	7	11.3	12	20.7
Living situation						
Biological parent	80	80.8	39	73.6	41	89.1
Relative foster care	3	3.0	3	5.7	0	0.0
Non-relative foster care	15	15.2	10	18.9	5	7.6
Homeless	1	1.0	1	1.9	0	0.0
Rehospitalization						
Yes	66	34.0				
No	128	66.0				

Note. Chi-squares tests were run to examine differences in descriptive data between youth who experienced psychiatric rehospitalization and those who did not.
*=$p<0.05$

(*M*=20.93, SD=16.17) and 34% of youth experienced psychiatric rehospitalization during the study period. For youth who rehospitalized during the study period, days to psychiatric hospitalization was defined as the number of days between discharge from and readmission to the study hospital. For youth who were not rehospitalized during the study period, the number of days from discharge until the end of the study (October 1, 2010) was computed. Correlations between variables included in the survival analysis are presented in Table 3.

Scores on individual CANS items ranged from zero (dimension where there is no evidence of any needs for need items or domain where strengths exist that can be used as a centerpiece for a strength-based plan for strengths items) to three (dimension that requires immediate or intensive action for need items or domain in which efforts are needed in order to identify potential for strength building efforts for strengths items). However, the scores across the six proposed social ecological theory driven factors varied in their rated severity at discharge. For example, examining items from the proposed youth strengths factor, all three items had average scores nearing the moderate range of impairment (i.e., a "2" rating on the CANS item), indicating a significant need for strength building efforts in these domains. Regarding the proposed youth capacity factor (e.g., developmental and intellectual functioning), all three items had average scores indicating no/minimal evidence of need in these areas. There was greater variability across items in the proposed youth emotional/behavioral needs factor, ranging from no evidence of need to moderate impairment. Anger control (*M*=1.57, *SD*=0.64),

Table 3. Correlations between demographic, service-related, and CANS items

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Age	1.00												
2 Highest CAPI	-.241*	1.00											
3 Hosp hx	.099	.079	1.00										
4 Hosp hx (other)	.153	-.133	-.180*	1.00									
5 Length of stay	-.235	.351**	.128	-.066	1.00								
6 Family strength	.183*	.049	.097	-.022	.194*	1.00							
7 Interpersonal strength	.000	.204*	.065	.012	.140	.087	1.00						
8 Educational strength	-.005	.199*	.231*	-.034	.077	.202**	.247**	1.00					
9 Well-being	.308**	-.025	-.064	.138	-.231*	-.016	.180*	.014	1.00				
10 Optimism	.261**	-.085	-.005	.002	.008	.185**	.156*	.093	.323**	1.00			
11 Talent/interest	-.562**	.306*	.007	-.106	.178	.041	-.022	.257**	-.271**	-.129	1.00		
12 Spiritual/religious	-.129	-.033	.032	-.131	.064	-.026	-.080	.167*	-.118	.017	.269**	1.00	
13 Community life	.287**	.136	-.001	.103	.062	.371**	.092	.212**	-.019	.046	.049	.222*	1.00
14 Relationship perm	.230**	-.044	.038	.057	.162	.552**	.003	.055	.024	.184*	-.132	-.036	.273**
15 Adj to trauma	-.259**	.059	-.091	-.073	.274**	.135	-.062	-.188**	-.108	.043	.089	.034	-.008
16 Re-exper. trauma	-.427**	.071	-.086	-.099	.170	.114	-.091	-.119	-.169*	.048	.219**	.026	-.055
17 Avoidance	.145	-.095	.039	.064	.027	.201**	.051	-.086	.120	.132	-.216**	-.010	.065
18 Numbing	.013	.061	-.014	.029	.136	.078	.016	-.236**	.016	.132	-.156*	.002	.058
19 Dissociation	-.027	.083	.029	.025	.070	.051	.112	.055	.000	-.026	-.040	.000	.058
20 Family functioning	.191*	.079	.159	.038	-.014	.418**	.111	.128	-.012	.133	-.105	-.080	.247**
21 Living situation	.192*	.039	.082	.143	.138	.354**	.180*	.095	.040	.186**	-.177*	-.086	.204**
22 Developmental/IQ	.086	.115	.178*	.114	.039	.026	.356**	.271**	.016	-.006	-.067	.016	.003
23 Legal	.266**	.041	.130	-.028	-.029	.127	.081	.043	.117	.220**	-.154*	-.010	.163*
24 Medical	.262**	-.128	.015	.270**	-.126	-.040	.097	-.082	.242**	.017	-.257**	-.080	.132
25 Physical	.088	-.086	.036	.126	-.038	.027	-.017	.030	.089	-.113	-.063	-.017	.058
26 School behavior	-.058	.246**	.043	-.019	.079	.042	.130	.291**	.035	-.033	.005	.022	.017
27 School achievement	.141	.158	.084	-.065	.032	-.030	.209**	.350**	.148*	-.019	-.003	-.037	.080
28 School attendance	.295**	-.035	.120	.143	.061	.068	.121	.102	.135	.072	-.261**	-.080	.046

	1	2	3	4	5	6	7	8	9	10	11	12	13
29 Substance abuse	.079	.126	.122	-.088	-.110	.061	-.063	.033	.044	-.034	.026	.047	.061
30 Attachment diff	-.108	.039	.032	.005	.164	.185**	.121	.040	-.169*	.034	.078	-.024	-.041
31 Affect dysregulation	.048	.289**	.046	.020	.084	-.002	.176*	-.042	-.036	.088	-.260**	-.041	.075
32 Somatization	.139	.153	.076	.033	.056	.074	.119	-.053	.032	.077	-.158*	-.184*	.109
33 Anger control	.223*	-.002	.072	.142	.042	.062	.113	.101	.089	.066	-.274**	.013	.095
34 Other self-harm	.545**	-.112	.193*	.180*	-.132	.189**	.180*	.102	.255**	.128	-.361**	-.109	.168*
35 Danger to others	-.051	-.027	.020	.113	.042	-.113	.057	-.183*	-.026	-.092	-.200**	.015	.054
36 Runaway	.359**	.015	.081	.112	-.019	.209**	.102	-.028	.144*	.194**	-.328**	-.192**	.139
37 Delinquency	.276**	.001	.010	-.037	-.141	.109	.123	.042	.137	.157*	-.207**	.031	.108
38 Judgment	.639**	-.050	.058	.135	-.268**	.196**	.181*	.122	.436**	.133	-.462**	-.156*	.248**
39 Fire setting	.223*	-.143	.110	-.034	-.132	.006	.055	.010	.133	.157*	-.107	-.073	.030

	14	15	16	17	18	19	20	21	22	23	24	25	26
14 Relationship perm	1.00												
15 Adj to trauma	.277**	1.00											
16 Re-exper. trauma	.204**	.794**	1.00										
17 Avoidance	.376**	.600**	.399**	1.00									
18 Numbing	.285**	.563**	.389**	.452**	1.00								
19 Dissociation	.058	.208**	.100	.070	.056	1.00							
20 Family functioning	.272**	.055	-.018	.156*	.122	-.087	1.00						
21 Living situation	.258**	.090	-.006	.293**	.180*	-.026	.672**	1.00					
22 Developmental/IQ	-.039	-.120	-.125	.003	-.134	.258**	.102	.020	1.00				
23 Legal	.099	-.001	-.020	.147*	.150*	.017	.069	.100	-.013	1.00			
24 Medical	.076	-.097	-.171*	.077	.146*	.252**	.035	.092	.252**	.304**	1.00		
25 Physical	-.033	-.187**	-.165*	-.085	-.096	-.043	.018	.027	.091	-.057	.221**	1.00	
26 School behavior	.037	-.068	-.043	.018	-.096	.017	-.024	.020	.079	.106	-.136	-.045	1.00
27 School achievement	-.009	-.107	-.049	.014	-.075	.113	.006	.069	.351**	.110	.082	-.045	.337**
28 School attendance	.094	.043	.064	.270**	.164*	.118	.050	.161*	.030	.279**	.126	-.035	.119
29 Substance abuse	.062	.010	-.016	-.067	-.062	-.021	.048	-.116	-.051	-.028	-.058	-.021	.014
30 Attachment diff	.196**	.185**	.132	.095	.075	-.006	.228**	.147*	.198**	-.010	-.017	.033	-.130
31 Affect dysregulation	.103	.122	.049	.223**	.166*	.156*	.271**	.233**	.290**	.079	.074	-.036	.235**
32 Somatization	.033	.030	-.037	.032	-.015	.332**	.085	.068	.035	.084	.106	-.064	-.112
33 Anger control	.184*	.048	-.047	.197**	.180*	.041	.307**	.305**	.186**	.148*	.197**	.091	.242**
34 Other self-harm	.241**	-.088	-.195**	.195**	.065	.125	.205**	.162*	.294**	.269**	.257**	.077	.066
35Danger to others	.055	.101	.077	.140	.176*	-.011	.112	.125	.103	.043	.158*	.048	.212**
36 Runaway	.224**	-.002	-.073	.179*	.121	.063	.186**	.102	.140	.056	.120	-.090	.127
37 Delinquency	.024	-.094	-.118	.069	.008	-.025	-.070	-.013	.002	.683**	.178*	-.067	.163*
38 Judgment	.222**	-.093	-.247**	.195**	.048	.241**	.138	.130	.295**	.217**	.391**	.131	.099
39 Fire setting	-.024	-.184	-.220	-.049	-.026	-.031	.039	-.001	.031	.213**	.113	-.065	.090

	27	28	29	30	31	32	33	34	35	36	37	38	39
27 School achievement	1.00												
28 School attendance	.292**	1.00											
29 Substance abuse	-.050	-.032	1.00										
30 Attachment diff	.037	-.089	-.017	1.00									
31 Affect dysregulation	.168*	.076	-.084	.031	1.00								
32 Somatization	.016	.077	-.032	-.063	.211**	1.00							
33 Anger control	.193**	.121	-.090	-.022	.477**	.096	1.00						
34 Other self-harm	.207**	.228**	-.004	.168*	.208**	.112	.246**	1.00					
35Danger to others	.040	.034	-.106	-.026	.431**	.046	.496**	.060	1.00				
36 Runaway	.113	.277**	-.006	.045	.200**	.142*	.219**	.419**	.179*	1.00			
37 Delinquency	.089	.180*	.231**	-.022	.008	.042	.071	.230**	-.051	.034	1.00		
38 Judgment	.298**	.214**	.091	-.003	.173*	.193**	.273**	.640**	.028	.408**	.285**	1.00	
39 Fire setting	-.023	.046	.181*	-.085	-.056	.017	-.058	.126	-.068	.149*	.234**	.167*	1.00

Note. CANS=Child and Adolescent Needs and Strengths, CAPI=Acuity of Psychiatric Illness, Child and Adolescent Version. *=$p<0.05$, **=$p<0.01$, ***=$p<0.001$

danger to others (*M*=1.57, *SD*=0.48), and affect dysregulation (*M*=1.48, *SD*=0.59) had the highest mean ratings across the sample, all within the moderate range of impairment and indicating a need for action to address the identified risk behavior. Regarding the proposed traumatic stress symptoms factor, adjustment to trauma was the item with the highest mean rating (*M*=0.92, *SD*=0.85), indicating mild impairment and a need for continued monitoring. Within the proposed family functioning factor, all items except attachment difficulties (*M*=0.64, *SD*=0.83), fell within the moderate range of impairment, indicating a need for action to address the domain deficits. Finally, within the proposed greater social ecological system functioning factor, the items spiritual/religious strength (*M*=2.08, *SD*=0.93) and community life (*M*=1.71, *SD*=0.49) had the highest mean ratings, both within the moderate range of impairment and indicating a need for action to build strengths in these areas and address domain deficits.

Independent t-tests were run to compare descriptive data for youth who experienced psychiatric rehospitalization and those who did not during the study period. T-tests revealed significant group differences for the number of previous hospitalizations at the study hospital (*p*=0.014)—rehospitalized youth experiencing more prior hospitalizations (*M*=1.90, *SD*=1.51) than youth who did not experience a rehospitalization during the study period (*M*=1.23, *SD*=1.48). Chi-square statistics were run to compare categorical descriptive data (i.e., gender, custody status, living situation) for youth who experienced psychiatric rehospitalization and for those who did not. Chi-square analyses revealed significant group differences for custody status, χ^2 (2,

N=120)=6.50, *p*=0.039—more youth who were not rehospitalized were in the child welfare system and more rehospitalized youth were adopted.

Factor Structure of the CANS

Identifying and Handling Missing Data

As described previously, the sample size requirement is significant when performing CFA due to the number of estimated parameters. Floyd and Widaman (1995) suggest a sample size containing five to ten participants per estimated parameter in the CFA model. The oblique, six-factor CANS model derived from social ecological theory includes the most estimated parameters of the models being compared. The oblique, six-factor CANS model has 83 estimated parameters in all (34λ. + 34δ + 15φ). Therefore, a sample size of at least 415 is needed to run the CFA, using the criteria of five participants per estimated parameter. Both listwise deletion and the maximum likelihood approaches were used to handle missing data. The listwise deletion technique was used in cases missing more than a quarter of items (i.e., missing nine or more items). This procedure reduced the original sample size of 226 to 213 youth. The listwise deletion technique was also used in cases missing a medical record number. While the patient identification number is unique to the particular episode of care, the medical record number is consistent across hospitalizations. Without the medical record number it was impossible to determine if the participant experienced psychiatric rehospitalization. As a result, these 19 participants were removed from the dataset, reducing the sample size to 194.

The maximum likelihood approach using PRELIS was used to address the remaining missing data. Prior to utilizing this method, items scored as "unknown" were

converted to system missing. Overall, there were 181 pieces of data missing, out of a total of 6596 pieces of data (2.74%). Due to the small proportion of missing data, data imputation via PRELIS 2.8 in LISREL 8.8 was used to minimize modifications and allow for randomness and variability in the imputed data (Kline, 2011). Imputed data was based on the 34 CANS items. Correlations between data prior to imputation and after imputation were conducted to insure that imputation did not result in significant changes to the data, and this analysis suggested that the imputation did not significantly alter the data.

Analysis Strategy

Confirmatory factor analysis (CFA) via LISREL 8.8 was used to examine the factor structure of the CANS. Chi-squared values and indices of both absolute and relative fit were used to compare the fit of contrasting factor structures. Specifically, absolute fit was assessed using the root means square error of approximation (RMSEA) and standardized root mean square residual (SRMR) and relative fit was assessed using the comparative fit index (CFI) and non-normed fit index (NNFI). Acceptable absolute fit statistics were taken from Hu and Bentler's (1999) criteria of values less than or equal to 0.08. Acceptable relative fit indices were taken from Marsh and colleagues' (1988) criteria of values greater than 0.9. In addition to these conventional measures of acceptable fit, comparisons between competing models also contributed to the interpretation of model fit. CFA was used to compare the fit of four competing models: (1) a global, one-factor model, (2) an oblique, five-factor model proposed by the author

of the CANS, (3) an oblique, six-factor model based on social ecological theory, and (4) an orthogonal, six-factor model, again, based on social ecological theory.

Ordinal vs. maximum likelihood (ML) CFA. Maximum likelihood (ML) is the traditional method of estimation in CFA. This technique assumes that observed variables are both continuous and normally distributed. When observed variables are ordinal, rather than continuous, the assumption of continuity is violated. The ML technique, which utilizes the covariance matrix, does not produce accurate results when used with ordinal observed variables, particularly when the number of categories on the ordinal scale is small (e.g., five or fewer; Flora & Curran, 2004). Specifically, when ordinal variables are used with the standard ML technique the chi-square model fit statistic is inflated (Babakus, Ferguson, & Joreskog, 1987; Green, Akey, Fleming, Hershberger, & Marquis, 1997; Hutchinson & Olmos, 1998; Muthen & Kaplan, 1992), estimated parameters are underestimated (Babakus et al., 1987; Muthen & Kaplan, 1992), and the estimate of standard error is reduced (Muthen & Kaplan, 1985, 1992). The four-point Likert scale used by the CANS could be interpreted as an ordinal scale of measurement due to quantification of needs and strengths. As a result, ordinal CFAs using the Weighted Least Squares (WLS) analysis method were performed with polychoric correlations and the asymptotic covariance matrix generated in PRELIS, in addition to the traditional CFA with the ML method, to account for the potential interpretation of the CANS as being on an ordinal scale. The section below first presents the results of the CFA using the ML analysis method, followed by the ordinal CFA.

Confirmatory Approaches

CFA with ML analysis method. The first hypothesis suggested that a measurement model of the CANS consisting of six correlated factors (youth strengths, youth capacity, youth emotional/behavioral needs, traumatic stress symptoms, family functioning, and greater social ecological system functioning) would provide good fit, according to both absolute and relative fit statistics, for this sample of youth being discharged from an inpatient psychiatric hospital. This hypothesis was not supported, as the overall goodness of fit of the six-factor, oblique model was poor: χ^2 (512, N=194) = 535.23, and the model provided mixed findings of absolute fit, RMSEA=0.0899 and SMRM=0.107, and poor relative fit statistics, NNFI=0.693 and CFI=0.664 (see Table 4).

Table 4. Goodness of fit statistics for CANS factor models

	Measures of Fit								
Factor Model	χ^2	*df*	$\Delta\chi 2$	Δdf	*p*	RMSEA	SRMR	NNFI	CFI
1 One global factor	1811.21	527				.119	.118	.484	.451
2 Five oblique factors	1394.89	517	118.91	5	<.0001	.0978	.119	.647	.617
3 Six oblique factors	1275.98	512	535.23	15	<.0001	.0899	.107	.693	.664
4 Six orthogonal factors	2293.65	527	1017.67	15	<.0001	.153	.161	.291	.245
5 Six oblique factors with five skewed items dropped	984.96	362	291.02	150	<.0001	.094	.108	.750	.719
6 Six oblique factors with correlated error terms and five skewed items dropped	**912.03**	**360**	**72.93**	**2**	**<.0001**	**.095**	**.108**	**.719**	**.751**

Note. CANS=Child and Adolescent Needs and Strengths, χ^2=chi-square test statistic, *df*=degrees of freedom, $\Delta\chi 2$=change in chi-square test statistic, Δdf =change in degrees of freedom, RMSEA=root mean square error of approximation, SRMR=standardized root mean square residual, NNFI=non-normed fit index, CFI=comparative fit index. Bolded model provided the best fit to the data.

The overall goodness of fit for the global, one-factor model of the CANS was poor: χ^2 (527, N=194) = 1811.21, and none of the indices of absolute (RMSEA=0.119 and SMRM=0.118) or relative fit (NNFI=0.484 and CFI=0.451) were acceptable. However, hypothesis 1b was supported, with the six-factor, oblique model demonstrating significantly improved fit from the global, one-factor model: $\Delta\chi^2$(df=15, *N*=194) = 353.23, p<0.0001. This improved fit suggests that the CANS is a multidimensional measure.

The overall goodness of fit for the six-factor, orthogonal model of the CANS was also poor: χ^2 (527, N=194) = 2293.65, and none of the indices of absolute (RMSEA=0.153 and SMRM=0.161) or relative fit (NNFI=0.291 and CFI=0.245) were acceptable. Hypothesis 1c was also supported; the six-factor, oblique model had significantly better fit compared to the six-factor orthogonal model: $\Delta\chi^2$(df=15, *N*=194) = 1017.67, p<0.0001.

To test the final component of the first hypothesis, the fit of the five-factor CANS model proposed by the author of the CANS was tested and compared to that of the six-factor, oblique model based on social ecological theory. The overall goodness of fit for the five-factor, oblique model was poor: χ^2 (517, N=194) = 1394.89, and none of the indices of absolute (RMSEA=0.0978 and SMRM=0.119) or relative fit (NNFI=0.647 and CFI=0.617) were acceptable. The chi-square differences test supported hypothesis 1d; the six-factor, oblique model informed by social ecological theory significantly improved fit compared to the five-factor, oblique model proposed by the CANS: $\Delta\chi^2$(df=5, *N*=194) = 1394.89, p<0.0001.

Although the six-factor, oblique model informed by social ecological theory demonstrated the best fit when compared to the other proposed models using the chi-square differences test, this model demonstrated poor overall goodness of fit. Frequencies were run to explore if item variability may be contributing to poor fit. Five items (legal functioning, physical functioning, substance abuse, dissociation, somatization) emerged with a strong positive skew and extremely low variability (i.e., greater than or equal to 90% of cases indicated "no evidence of any needs"), suggesting that these items may not be relevant to the sample or the population of psychiatrically hospitalized youth as a whole. Although the removal of the highly skewed items significantly improved model fit according to the chi-square differences test: $\Delta\chi^2$(df=150, *N*=194) = 291.02, $p<0.0001$, the overall goodness of fit for this version of the six-factor, oblique model remained poor: χ^2 (362, N=194) = 984.96, and none of the indices of absolute (RMSEA=0.094 and SMRM=0.108) or relative fit (NNFI=0.750 and CFI=0.719) were acceptable (see Figure 9).

Further examination of the estimated parameters yielded from the correlated, six-factor model with the five highly skewed items indicated a need for further model refinement (see Tables 5 and 6). Examination of factor loadings indicated that not all measured x-variables significantly loaded onto their proposed latent variables; two of the 29 remaining CANS variables did not load onto its respective factor (see Table 5). Examination of the factor intercorrelations (phi matrix) indicated seven significant factor intercorrelations (see Table 6). All latent variables significantly correlated with at least

Figure 9. Proposed correlated, six-factor Child and Adolescent Needs and Strengths model based on social ecological theory

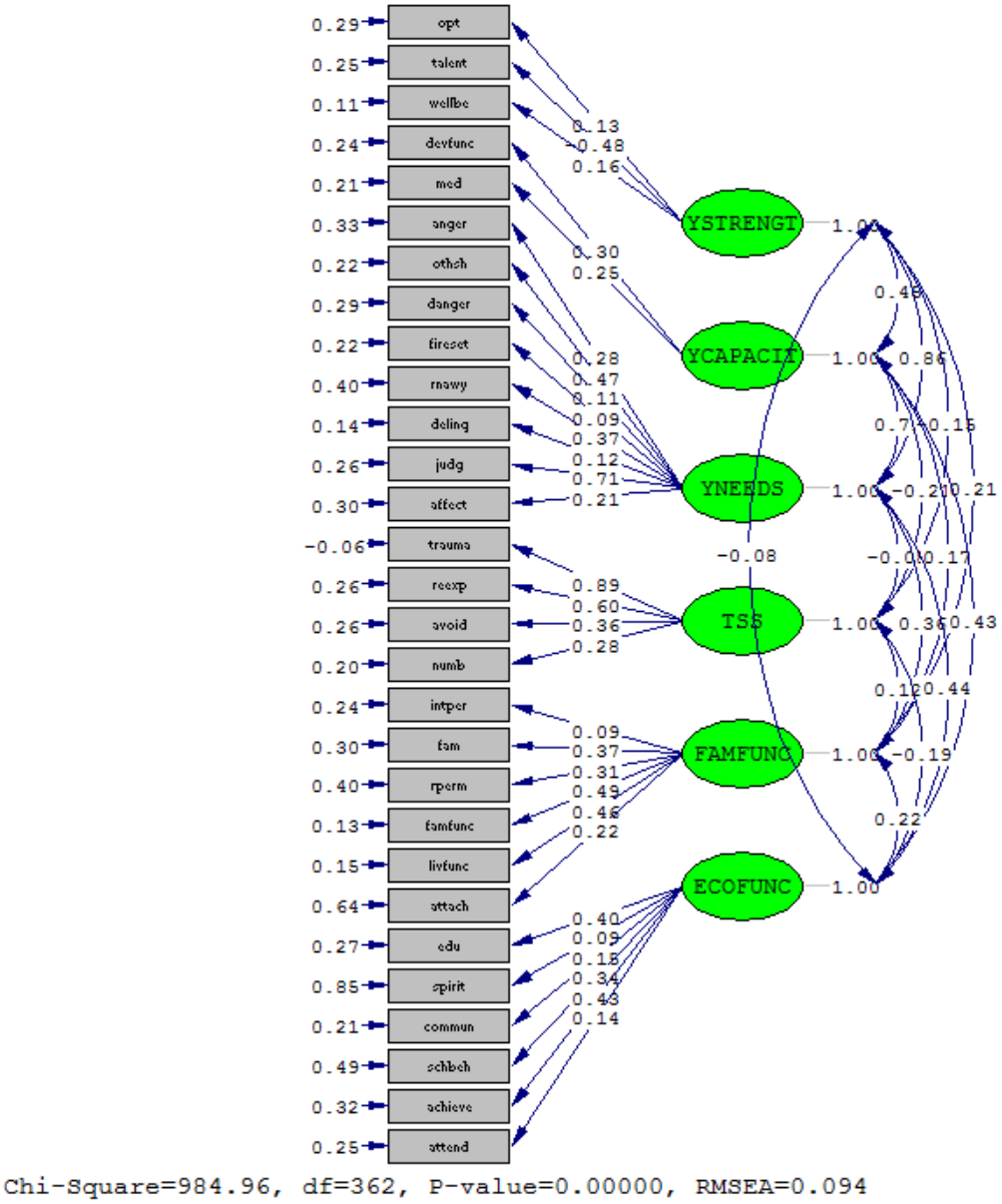


Table 5. Factor loadings from correlated, six-factor LISREL analysis of CANS removing five highly skewed items

Factor	Item	Loading	SE	Z-score
Youth strengths	Optimism	0.127	0.045,	2.838
	Talent/Interest	-0.482	0.060	-8.009
	Well-being	0.157	0.029	5.466
Youth capacity	Developmental/IQ	0.301	0.056	5.406
	Medical functioning	0.251	0.049	5.159
Youth emotional/behavioral needs	Anger control	0.285	0.047	6.014
	Other self-harm	0.471	0.044	10.627
	Danger to others	0.108	0.042	2.565
	Fire setting	0.086	0.037	2.307
	Runaway	0.372	0.053	7.001
	Delinquency	0.116	0.029	3.938
	Judgment	0.713	0.056	12.747
	Affect dysregulation	0.209	0.044	4.726
Traumatic stress symptoms	Adjustment to trauma	0.891	0.047	18.989
	Re-experiencing	0.602	0.050	12.105
	Avoidance	0.357	0.041	8.667
	Numbing	0.282	0.035	7.979
Family functioning	Interpersonal strength	0.093	0.040	2.362
	Relationship perm.	0.311	0.053	5.826
	Family functioning	0.491	0.042	11.592
	Living situation	0.464	0.043	10.874
	Attachment diff.	0.224	0.065	3.443
Greater social ecological system functioning	Educational strength	0.403	0.055	7.310
	Spiritual/Religious	0.088	0.081	1.087
	Community life	0.151	0.042	3.622
	School behavior	0.338	0.066	5.147
	School achievement	0.432	0.059	7.268
	School attendance	0.139	0.045	3.075

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization. CANS=Child and Adolescent Needs and Strengths

Table 6. Intercorrelations of CANS factor scores

Factor	1	2	3	4	5	6
1. Youth strengths	1.00					
2. Youth capacity	0.449**	1.00				
3. Youth emotional/behavioral needs	0.858***	0.792***	1.00			
4. Traumatic stress symptoms	-0.148	-0.208	-0.084	1.00		
5. Family functioning	0.209	0.166	0.360***	0.122	1.00	
6. Greater social ecological system functioning	-0.084	0.432**	0.437***	-0.194	0.223*	1.00

Note. CANS=Child and Adolescent Needs and Strengths
*p<0.05, **p<0.01, ***p<0.001

one other latent variable, except for the proposed traumatic stress symptoms factor, which did not significantly correlate with any of the other factors. Also notable was that the phi matrix was not positive definite, suggesting a problem with model fit. A non-definite indicates that the matrix contains negative eigenvalues. These negative values are unacceptable as they suggest that more than 100% of the variance is explained by the proposed latent variable (Wothke, 1993). The non-positive definite matrix is likely the result of the model having too many variables and too few cases of data (Field, 2009).

As a result of the examination of estimated parameters, modifications were made to the six-factor, oblique model in order to improve overall model fit. Correlated error terms were added to the model. Specifically, shared unique error variance was allowed between the following pairs of items on the proposed traumatic stress symptoms factor: adjustment to trauma and re-experiencing and adjustment to trauma and avoidance. Correlated error was allowed as ratings on these pairs of items may be related. First, the

presence of a trauma history would influence the rater's scoring of all three of these items, with the adjustment to trauma variable standing in as a proxy for the presence of a trauma history. If the youth had no evidence of trauma in his/her past, the rater would likely score all three items as zeros. Second, for those youth with a significant trauma history, the rater may see there being two routes for a child to take in response to a trauma: to experience symptoms of distress (i.e., re-experiencing the trauma) or to avoid the incident in an attempt to cope. Again, although the removal of the highly skewed items and addition of correlated error terms significantly improved model fit, according to the chi-square differences test: $\Delta\chi^2(\text{df}=2, N=194) = 72.93$, $p<0.0001$, compared to the oblique, six-factor model with the five highly skewed factors removed; the overall goodness of fit for this version of the six-factor, oblique model remained poor: χ^2 (360, N=194) = 912.03, and none of the indices of absolute (RMSEA=0.095 and SMRM=0.108) or relative fit (NNFI=0.719 and CFI=0.751) were acceptable.

Ordinal CFA using weighted least squares analysis method. Since some statisticians consider a Likert scales like that used by the CANS to be an ordinal (Flora & Curran, 2004), the models described above were also tested using ordinal CFA with a WLS analysis approach. When using the WLS method, models cannot be compared using the chi-square differences test. Model fit is assessed by the significance of absolute and relative fit statistics alone. When using the ordinal approach, the overall goodness of fit remained poor across models and measures of both the absolute and relative fit statistics were largely unacceptable (see Table 7). However, the oblique, five-factor model proposed by the authors of the CANS: χ^2 (517, N=194) = 8739.20, demonstrated

acceptable relative fit statistics (NNFI=0.87 and CFI=0.88), but there was significant room for improvement in the absolute fit statistics (RMSEA=0.24 and SRMR=0.28). Since none of the CANS measurement models tested demonstrated acceptable fit statistics using either traditional or ordinal CFA methods, exploratory factor analysis approaches were used in an attempt to provide support for the proposed six-factor model informed by social ecological theory.

Table 7. Goodness of fit statistics for CANS factor models using ordinal confirmatory factor analysis method

				Measures of Fit			
Factor Model	χ^2	*df*	p<	RMSEA	SRMR	NNFI	CFI
1 One global factor	11793.67	527	.0001	.33	.34	.27	.31
2 Five oblique factors	**8739.20**	**517**	**.0001**	**.29**	**.29**	**.87**	**.88**
3 Six oblique factors	6052.97	512	.0001	.24	.28	.65	.68
4 Six orthogonal factors	9378.02	527	.0001	.16	.29	.71	.73

Note. CANS=Child and Adolescent Needs and Strengths, χ^2=chi-square test statistic, *df*=degrees of freedom, RMSEA=root mean square error of approximation, SRMR=standardized root mean square residual, NNFI=non-normed fit index, CFI=comparative fit index. Bolded model provided the best fit to the data.

Exploratory Approaches

Principal component analysis with oblique rotation methods. Due to the belief that CANS factors would be interrelated, oblique rotation methods were first applied to exploratory factor analysis strategies, prior to testing orthogonal methods. PCA was conducted on the 34 item CANS with oblimin rotation. However, the pattern matrix failed to converge after 30 iterations, suggesting instability of the structure. The PCA on 34 items with promax rotation was successful (see Table 8). The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the analysis, KMO=0.692. All CANS items except substance abuse (KMO=0.344) had KMO values over the acceptable limit of 0.5 (Field, 2009). Bartlett's test of sphericity, χ^2 (561) = 2204.345, p<.001, indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Eleven components had eigenvalues over Kaiser's criterion of 1.0 and in combination explained 66.22% of the variance. The scree plot was slightly ambiguous and showed inflexions that would justify retaining both two and seven components. The component correlation matrix (see Table 9) suggested that the constructs are interrelated (i.e., seven correlations greater than .30 between the 11 constructs). As a result, independence of constructs cannot be assumed and the obliquely rotated solution is more meaningful than the orthogonally rotated solutions.

Table 8. Component score coefficient matrix for the principal component analysis of the CANS using promax rotation

	Component										
	1	2	3	4	5	6	7	8	9	10	11
Family strength	.073	**.793**	-.230	.043	.010	.004	-.044	-.053	.055	.044	.150
Interpersonal strength	-.036	-.019	.046	.256	-.092	.056	-.100	**.419**	.134	.348	-.195
Educational strength	-.189	.262	-.159	**.691**	-.353	-.027	-.077	.120	-.029	.079	-.071
Well-being	.049	-.189	-.142	.041	.050	-.154	.260	**.789**	-.146	-.209	-.073
Optimism	.157	.118	-.085	-.139	-.136	.036	-.249	**.913**	-.040	-.036	-.009
Talent/Interest	.047	.062	-.215	.176	**-.601**	-.044	-.207	-.065	.018	.107	.005
Spiritual/Religious strength	.135	.003	.197	.029	**-.888**	.064	.185	.151	-.093	-.111	.181
Community life	-.077	**.592**	.061	.018	-.420	.076	.242	-.069	.238	-.267	.132
Relationship permanence	.353	**.558**	-.048	-.022	.068	-.084	.063	-.029	-.043	.011	.234
Adjustment to trauma	**.916**	-.007	.046	-.090	-.115	-.043	-.172	.015	.111	.098	.036
Re-experiencing trauma	**.826**	-.045	-.030	.048	-.146	-.029	-.261	-.039	.052	.077	-.033
Avoidance	**.716**	.106	.075	.067	.087	.024	.042	.152	-.077	.179	-.113
Numbing	**.695**	.016	.165	-.208	-.041	.103	.092	.158	-.053	-.012	-.081
Dissociation	.188	-.114	-.035	.059	-.056	-.071	.091	-.106	**.782**	.031	-.006
Family functioning	-.129	**.751**	.213	-.127	.121	-.035	-.056	.022	-.077	.179	-.113
Living situation func.	-.024	**.669**	.159	-.013	.112	.033	.017	.127	-.082	.046	-.421
Dev./IQ functioning	-.083	-.161	.184	.280	-.070	-.081	.226	.005	.147	**.602**	.040
Legal functioning	.064	.048	-.008	.071	-.081	**.905**	.094	-.033	.000	.008	-.057
Medical functioning	.001	-.100	.072	-.227	-.077	.253	**.775**	.012	.187	.093	-.165
Physical functioning	-.185	.078	-.007	-.092	-.134	-.130	**.825**	-.166	-.233	.054	-.198
School behavior	-.056	-.076	.371	**.719**	-.023	.069	-.381	-.102	-.199	-.157	.164
School achievement	-.014	-.122	.015	**.836**	.083	.035	-.020	-.079	-.004	.106	-.200
School attendance	.178	.029	-.164	**.544**	.393	.247	-.008	-.109	.044	-.220	-.350
Substance abuse	-.038	.031	-.032	-.153	-.071	.097	-.182	-.063	-.060	.058	**.781**
Attachment difficulties	.182	.186	-.130	-.093	.115	.079	.082	-.203	-.205	**.837**	.103
Affect dysregulation	.079	.014	**.754**	.054	.041	-.033	-.170	-.020	.196	.098	.002

Somatization	-.146	.149	.046	-.209	.246	.009	-.211	-.040	**.848**	-.188	-.015
Anger control	.034	.130	**.727**	.145	-.064	-.005	.155	-.006	--.079	-.061	-.096
Other self-harm	-.022	.134	.003	.137	**.348**	.079	.312	.006	-.015	.254	.193
Danger to others	.101	-.108	**.854**	-.049	-.064	-.004	.083	-.173	-.069	-.060	.006
Runaway	.018	.155	.124	.114	**.550**	-.189	-.156	.057	.069	-.031	.276
Delinquency	-.036	-.066	-.022	.064	-.069	**.869**	-.006	-.037	-.068	.056	.276
Judgment	-.040	.078	-.019	.143	.277	-.006	**.407**	.137	.136	.034	.210
Fire setting	-.222	-.042	-.016	-.170	.102	.298	-.241	.276	-.036	.032	**.438**
Variance explained	14.186	9.680	6.705	6.424	5.537	4.942	4.264	3.857	3.778	3.576	3.272
Alpha	0.821	0.741	0.724	0.576	-0.204*	0.808	0.331	0.435	0.495	0.313	0.136

Note. Bolded numbers refer to the items that load onto each factor, based on criteria of choosing the highest loadings of an absolute value greater than 0.3. CANS=Child and Adolescent Needs and Strengths. *The alpha value is negative due to a negative average covariance among items and violates reliability model assumptions.

Table 9. Component correlation matrix for the principal component analysis of the CANS using promax rotation

Component	1	2	3	4	5	6	7	8	9	10	11
1	1.00										
2	.165	1.00									
3	.059	.176	1.00								
4	-.006	.171	.165	1.00							
5	.149	.143	.291	.172	1.00						
6	.039	.116	.125	.112	.248	1.00					
7	.057	.137	.192	.365	.382	.164	1.00				
8	-.056	.218	.241	.318	.397	.298	.355	1.00			
9	.036	.075	.135	.274	.134	.106	.272	.254	1.00		
10	-.097	.079	.085	.060	-.069	-.094	-.071	.095	.170	1.00	
11	.032	.106	.007	.336	.205	.085	.382	.227	.173	-.130	1.00

Note. CANS=Child and Adolescent Needs and Strengths

PCA with promax rotation was also run with different subsets of CANS data: removing the five factors identified to be highly negatively skewed (legal functioning, physical functioning, substance abuse, dissociation, somatization) and removing the item identified to have poor sampling adequacy (substance abuse). When the five highly skewed items were removed from the PCA with promax rotation, Bartlett's test of sphericity, χ^2 (406) = 1851.647, p<.001, indicated that all item correlations were sufficiently large for PCA and the KMO measure supported adequate sampling adequacy (KMO=0.714). All 29 remaining CANS items had KMO values greater than the limit of 0.5. The analysis rendered nine components with eigenvalues above 1.0 (See Table 10). Together these nine components explained 64.808% of the variance. Again, there was ambiguity in reading the scree plot and examination of the inflexion points suggested retaining either two or 10 components. Cronbach's alphas were computed to assess the internal consistency of the factors. The component correlation matrix (see Table 11) suggested that the extracted components are interrelated, supporting the use of the oblique rotation. When PCA with promax was conducted with all CANS items except substance abuse, which was found to have inadequate sampling adequacy in the initial analysis, all item correlations were sufficiently large (Bartlett's test of sphericity, χ^2 (528) = 2158.064, p<.001) and there was adequate sampling adequacy (KMO=0.701). The analysis rendered 11 components with eigenvalues greater than 1.0 (see Table 12). Combined, these 11 components explained 67.687% of the variance. Again, the scree plot was ambiguous, with inflexion points suggesting that either two or seven components be retained. Cronbach's alphas were computed to assess the internal

consistency of the factors. As with the previous analysis, the component correlation matrix (see Table 13) suggested that the extracted components are interrelated, supporting the use of the oblique rotation.

Table 10. Component score coefficient matrix for the principal component analysis of the CANS using promax rotation and excluding five highly skewed items

	Component								
	1	2	3	4	5	6	7	8	9
Family strength	.056	.309	-.219	**.406**	-.016	-.201	.303	.078	.150
Interpersonal strength	.040	-.130	.059	.161	**.506**	.077	-.128	.301	.256
Educational strength	-.168	-.146	-.164	.155	**.708**	-.200	.282	.012	-.013
Well-being	.032	.053	-.192	.070	.180	.343	-.102	.321	-.333
Optimism	.172	-.142	-.088	.261	-.002	-.048	-.068	**.728**	-.006
Talent/Interest	.064	**-.550**	-.212	-.063	.246	-.213	.270	-.066	.160
Spiritual/Religious strength	.108	**-.482**	.157	-.174	.049	.194	**.769**	.102	-.085
Community life	-.073	.068	.024	.193	.001	.228	**.809**	-.071	-.148
Relationship permanence	.302	**.421**	-.059	.204	-.122	-.077	.261	.007	.112
Adjustment to trauma	**.931**	-.077	.042	-.105	-.037	-.041	-.012	-.028	.136
Re-experiencing trauma	**.858**	-.169	-.024	-.143	.063	-.183	-.060	-.062	.107
Avoidance	**.726**	.168	.068	.045	.053	.081	.011	.036	-.049
Numbing	**.698**	-.004	.159	.020	-.181	.214	.072	.079	-.046
Family functioning	-.149	-.003	.192	**.870**	-.034	-.035	.042	-.035	.115
Living situation functioning	-.024	-.130	.166	**.896**	.058	.033	.016	-.013	-.096
Dev./IQ functioning	-.077	.170	.176	-.113	**.519**	.248	-.047	-.073	**.537**
Medical functioning	-.004	.188	.076	-.073	-.028	**.802**	.275	-.079	-.001
School behavior	-.057	.139	.384	-.158	.379	**-.668**	-.007	.169	-.212
School achievement	.027	.161	.009	-.103	**.797**	-.063	-.045	-.230	-.091
School attendance	.240	.303	-.130	.013	.389	-.024	-.116	-.144	**-.413**
Attachment difficulties	.166	.211	-.093	.059	.062	-.003	-.181	-.007	**.802**
Affect dysregulation	.099	.069	**.734**	.170	.076	-.097	-.075	.036	.127
Anger control	.014	.056	**.696**	.276	.090	.046	.150	-.051	-.130
Other self-harm	-.049	**.727**	-.004	-.069	.127	.221	.025	.040	.229
Danger to others	.083	.013	**.830**	.019	-.152	.002	.082	-.083	-.048
Runaway	-.013	**.738**	.106	-.010	-.047	-.172	-.187	.063	.085
Delinquency	.034	.256	.021	-.337	-.034	.010	.251	**.533**	-.059
Judgment	-.058	**.686**	-.049	-.089	.181	.364	.122	.046	.000
Fire setting	-.210	.222	-.002	-.129	-.226	-.170	-.039	**.653**	.052
Variance explained	15.8	11.18	7.76	7.03	5.81	4.99	4.43	**4.11**	3.70
Alpha	.821	.194	.724	.731	.624	-.288	.309	.385	.137

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization. CANS=Child and Adolescent Needs and Strengths

Table 11. Component correlation matrix for the principal component analysis of the CANS using promax rotation and excluding five highly skewed items

Component	1	2	3	4	5	6	7	8	9
1	1.00								
2	.144	1.00							
3	.008	.139	1.00						
4	.279	.344	-.021	1.00					
5	-.100	.204	.185	.068	1.00				
6	-.073	.125	.185	.011	.144	1.00			
7	.060	.147	-.127	.146	.041	-.351	1.00		
8	-.048	.226	.049	.121	.256	.265	-.029	1.00	
9	-.025	-.184	-.058	.072	-.032	-.129	.206	-.139	1.00

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization. CANS=Child and Adolescent Needs and Strengths.

Table 12. Component score coefficient matrix for the principal component analysis of the CANS items using promax rotation and excluding one item with poor sampling adequacy

	Component										
	1	2	3	4	5	6	7	8	9	10	11
Family strength	.053	.323	**.513**	-.243	.019	.017	-.081	.047	.185	-.064	.046
Interpersonal strength	-.013	-.158	.192	.043	.046	.272	-.073	.144	-.050	**.397**	.331
Educational strength	-.177	-.088	.184	-.168	-.036	**.629**	-.049	-.032	.306	.116	.074
Well-being	.067	.177	-.098	-.155	-.164	.090	.222	-.130	.000	**.759**	-.234
Optimism	.147	.051	.151	-.071	.051	-.159	-.290	-.043	.158	**.848**	-.020
Talent/Interest	.047	-.452	-.028	-.216	-.046	.147	-.134	.005	**.395**	-.068	.110
Spiritual/Religious strength	.106	-.225	-.229	.207	.078	-.051	.120	-.134	**.868**	.143	-.066
Community life	-.097	.131	.257	.059	.087	-.028	.160	.217	**.635**	-.071	-.240
Relationship permanence	.320	**.507**	.242	-.055	-.070	-.064	-.023	-.067	.189	-.035	.029
Adjustment to trauma	**.919**	-.054	-.075	.035	-.052	-.050	-.129	.101	.052	.017	.080
Re-experiencing trauma	**.836**	-.170	-.088	-.035	-.041	.071	-.189	.045	.027	-.036	.059
Avoidance	**.727**	.157	.080	.072	.014	.086	.034	-.078	-.041	.144	-.003
Numbing	**.704**	-.006	.029	.170	.096	-.173	.080	-.055	.041	.148	-.019
Dissociation	.193	.081	-.247	-.041	-.080	.088	.044	**.758**	.104	-.096	.039
Family functioning	-.108	-.042	**.899**	.191	-.051	-.064	.031	-.034	-.101	.021	.134
Living situation functioning	.028	-.234	**.925**	.152	-.002	.065	.126	-.027	-.165	.115	-.007
Dev./IQ functioning	-.095	.184	-.126	.182	-.080	.247	.142	.119	.041	.015	**.622**
Legal functioning	.072	-.144	.066	.004	**.940**	.059	.041	.002	.065	-.050	.008
Medical functioning	.020	.020	-.060	.081	.245	-.161	**.659**	.183	.108	.018	.094
Physical functioning	-.157	-.068	.136	-.015	-.159	-.021	**.794**	-.219	.112	-.140	.031
School behavior	-.075	.172	-.134	.355	.088	**.601**	-.360	-.206	.108	-.098	-.150
School achievement	.014	.066	-.066	.016	.013	**.784**	-.002	-.004	-.115	-.062	.097
School attendance	.231	.053	.107	-.152	.214	**.555**	.034	.068	-.366	-.094	-.248

Attachment difficulties	.161	.165	.187	-.125	.092	-.103	.032	-.227	-.191	-.196	**.849**
Affect dysregulation	.071	.072	.142	**.750**	-.035	.029	-.167	.196	.018	-.018	.106
Somatization	-.129	-.005	.170	.044	.000	-.149	-.191	**.861**	-.161	-.044	-.195
Anger control	.039	.065	.237	**.725**	-.016	.121	.142	-.071	.155	.000	-.059
Other self-harm	-.056	**.704**	-.043	.008	.102	.077	.134	-.047	-.080	.006	.289
Danger to others	.089	.035	-.012	**.860**	-.005	-.087	.058	-.073	.138	-.161	-.040
Runaway	-.032	**.848**	-.071	.136	-.167	.012	-.298	.036	-.180	.048	.020
Delinquency	-.050	-.010	-.103	-.038	**.920**	.059	-.048	-.067	.078	-.039	.044
Judgment	-.062	**.672**	-.105	-.034	.008	.131	.254	.116	.009	.141	.044
Fire setting	-.266	.246	-.095	-.047	**.357**	-.180	-.286	-.037	-.003	.251	.028
Variance explained	14.615	9.959	6.907	6.425	5.695	5.087	4.386	3.950	3.852	3.523	3.287
Alpha	0.821	0.690	0.731	0.724	0.624	0.576	0.331	0.495	0.403	0.435	0.313

Note. Substance abuse item excluded from this analysis due to inadequate sampling adequacy. Bolded numbers refer to the items that load onto each factor, based on criteria of choosing the highest loadings of an absolute value greater than 0.3. CANS=Child and Adolescent Needs and Strengths.

Table 13. Component correlation matrix for the principal component analysis of the CANS items using promax rotation and excluding one item with poor sampling adequacy

Component	1	2	3	4	5	6	7	8	9	10	11
1	1.00										
2	.128	1.00									
3	.219	.367	1.00								
4	.013	.112	-.036	1.00							
5	.032	.353	.099	.115	1.00						
6	-.094	.165	.056	.148	.110	1.00					
7	-.038	.261	-.056	.194	.202	.142	1.00				
8	.027	.199	.052	.131	.141	.189	.236	1.00			
9	.007	.029	.247	-.285	-.104	.098	-.239	-.023	1.00		
10	-.141	.201	-.018	.213	.296	.201	.283	.224	-.242	1.00	
11	-.084	-.113	.019	.018	-.130	.125	-.041	.190	.164	.075	1.00

Note. Substance abuse item excluded from this analysis due to inadequate sampling adequacy. CANS=Child and Adolescent Needs and Strengths.

Principal axis factoring with oblique rotation methods. Since perfect measurement of CANS items cannot be assumed (which is the case in PCA), PAF was also conducted on the three groups of CANS items—all items, removing the five highly skewed items, and removing the item (substance abuse) found to have poor sampling adequacy. As with the PCA analyses the pattern matrix failed to converge after 30 iterations when attempting PAF with oblimin rotation, suggesting instability of the structure. The results of these three PAF analyses with promax rotation were exactly the same as the PCA results with respect to the Bartlett's test of sphericity, KMO measure of sampling adequacy, number of components extracted, amount of variance accounted for, and support of the interrelation of constructs (see Table 14 for the component correlation matrix for the PAF with the five highly skewed items excluded). However, the composition of components extracted differed between the two approaches (see Table 10 and 15).

Table 14. Component correlation matrix for the principal axis factoring of the CANS using promax rotation and excluding five highly skewed items

Component	1	2	3	4	5	6	7	8	9
1	1.00								
2	-.061	1.00							
3	.358	.163	1.00						
4	.237	.181	.112	1.00					
5	.240	.112	.235	.397	1.00				
6	.191	-.143	.082	.152	.077	1.00			
7	.116	-.071	.038	.171	.213	.235	1.00		
8	-.295	-.141	-.319	-.072	.027	.101	.124	1.00	
9	.149	.023	-.047	.147	.142	.176	-.067	-.122	1.00

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization. CANS=Child and Adolescent Needs and Strengths.

Table 15. Component score coefficient matrix for the principal axis factoring of the CANS using promax rotation and excluding five highly skewed items

	Component								
	1	2	3	4	5	6	7	8	9
Family strength	-.043	.009	-.160	**.760**	.132	.014	-.020	.056	.034
Interpersonal strength	.117	.009	.027	-.111	.112	.182	.313	.010	.171
Educational strength	-.060	-.116	-.148	.116	.096	**.529**	.169	.239	.053
Well-being	**.518**	.021	-.131	-.175	.012	.056	-.067	-.027	.270
Optimism	.115	.060	.023	.052	.012	-.103	.059	.072	**.814**
Talent/Interest	**-.483**	.058	-.171	.051	-.067	.119	.120	.334	-.007
Spiritual/religious strength	-.045	.060	.147	.030	-.125	-.006	-.031	**.557**	.073
Community life	.247	-.035	.074	**.423**	.049	-.009	-.128	**.518**	-.074
Relationship perm.	.089	.221	.020	**.604**	.000	-.051	-.046	.046	.017
Adjustment to trauma	-.110	**.935**	.010	.071	-.073	-.025	.061	.035	.000
Re-experiencing trauma	-.278	**.782**	-.023	.053	-.101	.080	.047	.003	.018
Avoidance	.223	**.640**	.024	.079	.098	.073	-.044	-.032	.009
Numbing	.182	**.583**	.126	.000	.063	-.146	-.084	.081	.053
Family functioning	-.167	-.112	.131	.265	**.647**	-.083	.090	-.081	.009
Living situation	-.059	.032	.030	.009	**.907**	.050	-.077	-.087	.002
Dev./IQ functioning	.140	-.053	.162	-.123	-.094	.087	**.753**	.014	.002
Medical functioning	**.629**	.040	.054	-.159	.029	-.224	.126	.195	-.066
School behavior	-.169	-.080	.328	.087	-.127	**.660**	-.170	-.035	-.002
School achievement	.175	.076	-.026	-.160	.039	**.594**	.188	-.040	-.136
School attendance	.325	.225	-.124	-.069	.129	.358	-.149	-.149	-.088
Attachment difficulties	-.168	.108	-.087	.199	.060	-.149	**.445**	-.145	-.007
Affect dysregulation	-.093	.056	**.665**	-.043	.061	.083	.194	-.022	.076
Anger control	.075	.014	**.646**	-.017	.152	.132	.013	.128	.011
Other self-harm	**.525**	-.045	.003	.261	-.080	.026	.225	-.127	-.026
Danger to others	-.069	.047	**.787**	-.088	-.029	-.020	-.021	.122	-.058
Runaway	.245	-.036	.146	.304	-.103	.056	.037	-.240	.051
Delinquency	.378	-.014	-.033	.060	-.122	.107	-.113	.107	.112
Judgment	**.799**	-.018	-.063	.195	-.111	.080	.115	-.022	-.052
Fire setting	.225	-.179	-.063	.043	-.045	-.011	-.079	-.029	.168
Variance explained	15.8	11.18	7.76	7.03	5.81	4.99	4.43	4.11	3.70
Alpha	.257	.821	.724	.668	.804	.589	.313	.309	--

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization. Bolded numbers refer to the items that load onto each factor, based on criteria of choosing the highest loadings of an absolute value greater than 0.3. CANS=Child and Adolescent Needs and Strengths.

Parallel analysis. Since two exploratory factor analysis methods and the EFA within a CFA framework did not converge and the proposed CANS models failed to have adequate fit when tested using CFA, parallel analysis was run to assist in determining the number of components to retain. Parallel analysis creates randomly generated data sets with exactly the same number of cases and variables as in the raw data of the sample and repeatedly performs an exploratory factor analysis technique to render eigenvalues. These eigenvalues are compared to those found using the original raw data and components with eigenvalues greater that that found using parallel analysis are retained (Field, 2009; Tabachnik & Fidell, 2007).

The parallel analysis of the PCA with promax rotation suggested that six components be retained, both when random normal data and when raw data permutations were generated (see Table 16). Alternatively, the results of the PAF with promax rotation parallel analysis suggested that all nine components rendered from the PAF be retained, both when random normal data and when raw data permutations were generated (see Table 17). The results of the PCA parallel analysis, that is to retain six components, were used as it was the more parsimonious solution. The PCA solution may be identifying a smaller number of global dimensions, rather than highlighting a larger number of bloated specific factors to explain common variance, which is likely the case with the PFA approach.

Table 16. Parallel analysis of the CANS using principal component analysis extraction with promax rotation and excluding five highly skewed items

		Parallel analysis	
Component	PCA with promax rotation	Random normal data	Raw data permutation
1	4.582	1.910	1.910
2	3.243	1.758	1.762
3	2.249	1.657	1.662
4	2.040	1.578	1.578
5	1.685	1.504	1.501
6	1.446	1.435	1.432
7	1.285	1.374	1.376
8	1.192	1.317	1.318
9	1.072	1.265	1.266

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization. CANS=Child and Adolescent Needs and Strengths, PCA=Principal Component Analysis.

Table 17. Parallel analysis of the CANS using principal axis factoring extraction with promax rotation and excluding five highly skewed items

		Parallel analysis	
Component	PAF with promax rotation	Random normal data	Raw data permutation
1	4.582	1.083	1.084
2	3.243	0.928	0.932
3	2.249	0.823	0.825
4	2.040	0.740	0.735
5	1.685	0.661	0.658
6	1.446	0.595	0.585
7	1.285	0.529	0.527
8	1.192	0.468	0.472
9	1.072	0.415	0.415

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization. CANS=Child and Adolescent Needs and Strengths, PAF=Principal Axis Factoring.

Principal component analysis with oblique rotation methods, retaining only six components. PCA with promax rotation was performed again, retaining only six components, as recommended by the parallel analysis (see Table 18). Bartlett's test of sphericity, χ^2 (406) = 1851.647, p<.001, indicated that all item correlations were sufficiently large for PCA and the KMO measure supported adequate sampling adequacy (KMO=0.714). All CANS items had KMO values greater than the limit of 0.5. The six extracted factors explained 52.57% of the variance. As with the previous analyses, the component correlation matrix (see Table 19) suggested that the extracted components are interrelated, supporting the use of the oblique rotation. Cronbach's alphas were computed to assess the internal consistency of the factors (see Table 18).

Table 18. Component score coefficient matrix for the principal component analysis of the CANS using promax rotation, excluding five highly skewed items, and extracting only six components

	Component					
	1	2	3	4	5	6
Family strength	.072	.082	**.788**	-.223	-.034	.115
Interpersonal strength	.112	-.001	.003	-.012	**.552**	.031
Educational strength	-.033	-.161	.240	-.141	.464	**.536**
Well-being	**.680**	-.006	-.133	-.172	.012	-.076
Optimism	**.391**	.120	.248	-.219	-.070	.015
Talent/Interest	-.553	.046	.051	-.285	.150	**.339**
Spiritual/Religious strength	-.200	.023	.115	.052	-.098	**.485**
Community life	.096	-.106	**.601**	.038	-.144	.355
Relationship permanence	.160	.320	**.574**	-.052	-.088	.026
Adjustment to trauma	-.130	**.906**	-.014	.014	-.005	-.026
Re-experiencing trauma	-.230	**.849**	-.084	-.045	.036	.076
Avoidance	.245	**.708**	.101	.096	.009	-.012
Numbing	.139	**.652**	.053	.150	-.166	-.109
Family functioning	-.196	-.143	**.789**	.268	.004	-.098
Living situation functioning	-.083	-.031	**.690**	.278	-.038	-.034
Dev./IQ functioning	-.034	-.101	-.143	.121	**.798**	-.113
Medical functioning	**.398**	-.075	-.078	.085	.110	-.298
School behavior	.076	-.003	-.060	.399	.128	**.677**
School achievement	.174	.057	-.213	.113	**.616**	.348
School attendance	**.477**	.280	-.095	.026	.109	.184
Attachment difficulties	-.280	.166	.201	-.205	**.497**	-.397
Affect dysregulation	-.124	.089	.065	**.746**	.183	.088
Anger control	.000	-.002	.189	**.769**	.050	.207
Other self-harm	**.529**	-.035	.143	-.006	.319	-.189
Danger to others	-.171	.065	-.045	**.861**	-.080	.120
Runaway	**.424**	.045	.155	.139	.067	-.106
Delinquency	**.563**	.001	-.019	-.117	-.073	.215
Judgment	**.712**	-.058	.080	-.019	.247	-.112
Fire setting	**.438**	-.221	.067	-.158	-.169	.015
Variance explained	15.800	11.182	7.755	7.034	5.811	4.987
Alpha	0.710	0.821	0.741	0.724	0.472	0.427

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization. Bolded numbers refer to the items that load onto each factor, based on criteria of choosing the highest loadings of an absolute value greater than 0.3. CANS=Child and Adolescent Needs and Strengths.

Table 19. Component correlation matrix for the principal component analysis of the CANS using promax rotation, excluding five highly skewed items, and extracting only six components

Component	1	2	3	4	5	6
1	1.00					
2	-.029	1.00				
3	.190	.186	1.00			
4	.320	.076	.113	1.00		
5	.185	-.042	.274	.144	1.00	
6	-.044	-.080	-.113	-.240	.033	1.00

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization. CANS=Child and Adolescent Needs and Strengths.

EFA within the CFA framework. Due to the lack of convergence between the exploratory and confirmatory factor analysis methods with regard to the number of factors extracted and the items comprising these factors, "exploratory factor analysis within the CFA framework" (E/CFA; Joreskog, 1969; Joreskog & Sorbom, 1979) via LISREL 8.80 was used to explore the factor structure of the CANS. In addition to providing information regarding factor loadings, E/CFA also examines the statistical significance of both cross-loadings and error covariances (Brown, 2006). The results of the parallel analysis suggested that six factors be retained when performing E/CFA, supporting the six-factor, social ecological theory-driven model hypothesized.

As required by this analysis technique, anchor items were selected for each factor. Referent items were chosen for the proposed youth strengths, youth emotional/behavioral needs, traumatic stress symptoms, and family functioning factors, since the exploratory factor analysis methods supported these domains. The results of the exploratory factor

analysis methods suggested the existence of a separate "school" factor, distinct from greater social ecological system functioning. As a result, the hypothesized greater social ecological system factor was split and an anchor item was chosen for both a school-focused functioning factor and a broader community functioning factor. The proposed youth capacity factor was dropped in favor of the school-focused factor, as the capacity factor was not supported by results of the exploratory analysis methods. The proposed factors guided the selection of the anchor items. The item that theoretically captured the nature of the proposed factor best was chosen as the anchor (e.g., family functioning was selected as the anchor item for the proposed family functioning factor). Additionally, the factor loadings of exploratory factor analysis methods informed the selection process. The following items entered into the E/CFA as anchor items: optimism (proposed youth strengths factor), community life strength (proposed greater social ecological system functioning factor), adjustment to trauma (proposed traumatic stress symptoms factor), family functioning (proposed family functioning factor), school achievement (proposed school functioning factor), and affect dysregulation (proposed youth emotional/behavioral needs factor).

The E/CFA was run using the traditional ML estimation method as well as the WLS estimation method used when examining the structure of ordinal variables. The analysis was also run with different subsets of CANS items—all items, dropping the substance abuse item that had inadequate sampling adequacy, and dropping the five highly skewed items (i.e., dissociation, legal functioning, physical functioning, substance abuse, and somatization). The sample size (N=194) was too small to support E/CFA

models (both ML and WLS estimation methods) that include all 34 CANS items as these models include 223 estimated parameters and the program cannot estimate more model parameters than the number of observations in the sample. The sample size of 194 was also too small to support the E/CFA models (both ML and WLS estimation methods) that include all but one (substance abuse) CANS item as these models include 216 estimated parameters, greater than the number of observations in the sample. The E/CFA model that drops five CANS items reduces the number of estimated parameters to 188, which allows the program to successfully perform model estimation.

Overall, the squared multiple correlations for x-variables were larger in the WLS solution compared to the ML solution (see Table 20), suggesting that the WLS solution better accounts for variance in the items. Further inspection of the E/CFA with WLS solution when dropping five CANS items revealed negative unique error variances (i.e., Heywood cases) for the well-being (-1.550) and adjustment to trauma (-0.068) items, yielding the model inadmissible. The indefinite model estimates is likely the result of the small sample size. These problems occur frequently when the data does not provide enough information for the model estimated (Wothke, 1993). To overcome the problematic theta-delta estimates, the WLS solution dropping five CANS items was rerun with the theta-delta terms for the well-being and adjustment to trauma items fixed to zero. Fixing these terms corrected the negative error variances found in the previous model and produced an admissible solution (see Tables 21 and 22). The model had good fit, χ^2 (249, N=194) = 6737.85, and demonstrated acceptable relative (NNFI=0.90 and CFI=0.94) and absolute (RMSEA=0.02 and SRMR=0.08) fit statistics. Seven items

failed to significantly load onto one of the six factors—talent/interests, spiritual/religious strength, relationship permanence, attachment difficulties, other self-harm, runaway, and judgment. Cronbach's alphas were computed to assess the internal consistency of the factors suggested by the E/CFA solution (see Table 23).

Table 20. Squared multiple correlations from the exploratory factor analysis within the CFA framework of the CANS, excluding five highly skewed items

Item	ML solution	WLS solution
Family strength	0.688	0.805
Interpersonal strength	0.185	0.353
Educational strength	0.569	0.678
Well-being	0.259	2.550
Optimism	0.093	0.223
Talent/Interest	0.558	0.673
Spiritual/Religious strength	0.101	0.097
Community life	0.238	0.310
Relationship permanence	0.519	0.587
Adjustment to trauma	0.969	1.068
Re-experiencing trauma	0.696	0.843
Avoidance	0.514	0.733
Numbing	0.424	0.652
Family functioning	0.774	0.913
Living situation functioning	0.581	0.773
Dev./IQ functioning	0.323	0.570
Medical functioning	0.221	0.491
School behavior	0.297	0.292
School achievement	0.404	0.514
School attendance	0.127	0.594
Attachment difficulties	0.125	0.154
Affect dysregulation	0.452	0.603
Anger control	0.542	0.634
Other self-harm	0.513	0.745
Danger to others	0.571	0.643
Runaway	0.288	0.430
Delinquency	0.147	0.534
Judgment	0.749	0.842
Fire setting	0.089	0.521

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization. CFA=Confirmatory Factor Analysis, CANS=Child and Adolescent Needs and Strengths, ML=Maximum likelihood, WLS=Weighted Least Squares.

Table 21. Factor loadings from the correlated exploratory factor analysis within the CFA framework of the CANS, using the weighted least squares solution, and excluding five highly skewed items

Factor	Item	Loading	SE	Z-score
Youth strengths	Well-being	1.555	0.397	3.912
	Optimism*	0.479	0.073	6.606
	Medical functioning	1.151	0.338	3.407
	School attendance	0.984	0.249	3.949
	Delinquency	0.883	0.230	3.842
	Fire setting	0.994	0.272	3.648
Greater social ecological system functioning	Family strength	1.215	0.518	2.346
	Community life*	0.551	0.095	5.798
Traumatic stress symptoms	Adjustment to trauma*	1.018	0.035	28.80
	Re-experiencing trauma	1.051	0.147	7.150
	Avoidance	0.490	0.203	2.416
	Numbing	0.497	0.178	2.790
Family functioning	Family functioning*	0.956	0.046	20.72
	Living situation functioning	1.015	0.339	2.992
School functioning	Interpersonal functioning	0.706	0.271	2.609
	Educational functioning	1.024	0.409	2.505
	Developmental/IQ functioning	0.662	0.233	2.840
	School behavior	0.411	0.188	2.189
	School achievement*	0.717	0.057	12.58
Youth emotional/behavioral needs	Affect dysregulation*	0.777	0.063	12.43
	Anger control	0.807	0.222	3.635
	Danger to others	0.897	0.250	3.595

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization.
CFA=Confirmatory Factor Analysis, CANS=Child and Adolescent Needs and Strengths.
* denotes anchor item

Table 22. Intercorrelations of CANS factor scores from the correlated exploratory factor analysis within the CFA framework of the CANS, using the weighted least squares solution, and excluding five highly skewed items

Factor	1	2	3	4	5	6
1. Youth strengths	1.00					
2. Greater social ecological system functioning	0.642**	1.00				
3. Traumatic stress symptoms	0.173	0.000	1.00			
4. Family functioning	0.447*	0.719***	0.026	1.00		
5. School functioning	0.196	0.324	-0.149	-0.054	1.00	
6. Youth emotional/behavioral needs	-0.009	0.189	0.189	0.459***	0.416**	1.00

Note. The following CANS items were excluded from this analysis: dissociation, legal functioning, physical functioning, substance abuse, and somatization.
CFA=Confirmatory Factor Analysis, CANS=Child and Adolescent Needs and Strengths.
*p<0.05, **p<0.01, ***p<0.001

Table 23. Cronbach's alphas from the correlated exploratory factor analysis within the CFA framework of the CANS, using the weighted least squares solution, and excluding five highly skewed items

Factor	Alpha
Youth strengths	0.489
Greater social ecological system functioning	0.524
Traumatic stress symptoms*	0.821
Family functioning*	0.804
School functioning	0.633
Youth emotional/behavioral needs*	0.724

Note. CFA=Confirmatory Factor Analysis, CANS=Child and Adolescent Needs and Strengths.
*denotes factors with Cronbach's alpha coefficients above Nunnaly's (1978) criterion for acceptable internal consistency

Survival Analysis

A Cox regression survival analysis was performed to examine the influence of CANS, demographic, and service-related variables on time to psychiatric rehospitalization. Two techniques were employed to determine the appropriateness of

using CANS factors in the survival analysis—alpha coefficients and theoretical support. Nunnaly (1978) suggests an alpha coefficient between 0.70 and 0.90 to establish internal validity and support the use of items as a scale. Examination of the alpha coefficients for the PCA with promax rotation, extracting only six components, solution (see Table 18) revealed that only four of the six components (i.e., Components 1-4) meet Nunnaly's criteria. The items comprising Component 2 (adjustment to trauma, re-experiencing trauma, avoidance, and numbing) are consistent with the hypothesized traumatic stress symptoms factor, items comprising Component 3 (family strength, community life, relationship permanence, family functioning, and living situation functioning) are consistent with the hypothesized family functioning factor, and items comprising Component 4 (affect dysregulation, anger control, and danger to others) are consistent with the affect driven, externalizing symptoms piece of the hypothesized youth emotional/behavioral needs factor. However, a closer look at the items comprising Component 1 shows some theoretical inconsistency. More specifically, the component consists of items from the hypothesized youth strengths factor (optimism and well-being), youth emotional/behavioral needs factor (other-self harm, runaway, delinquency, judgment, and fire setting), youth capacity (medical functioning), and greater social ecological system functioning (school attendance). Due to the variation of the items comprising Component 1 and the low internal consistency of Components 5 and 6, there is not enough support to use these three components extracted from the PCA with promax rotation as factors in the survival analysis.

Examination of the alpha coefficients for the E/CFA solution revealed that only three of the six factors (i.e., traumatic stress symptoms, family functioning, and youth emotional behavioral needs) extracted meet Nunnaly's criteria for acceptable internal consistency. Comparing the results of the E/CFA to the PCA with promax rotation, extracting only six components, shows that the items comprising the proposed traumatic stress symptoms and youth emotional/behavioral needs factors of the E/CFA are identical to those found using PCA with promax rotation, supporting the use of these as factors in the survival analysis. Conversely, there was a discrepancy between the results of these two analyses with regard to the proposed family functioning factor. The E/CFA solution did not produce a discrete family functioning factor; rather, some items from the hypothesized factor loaded onto two separate factors in the E/CFA solution (greater social ecological system functioning and family functioning) and another item did not significantly load onto any of the extracted factors (i.e., relationship permanence). Because the family functioning factor extracted from the PCA has acceptable internal consistency and is theoretically sound, it will be used as a factor in the survival analysis rather than the two-item factor extracted in the E/CFA solution.

Based on examination of the alpha coefficients and theoretical consistency of the factors that emerged from the PCA with promax rotation, extracting only six factors, and the E/CFA, three factors entered the survival analysis—traumatic stress symptoms (comprised of adjustment to trauma, re-experiencing trauma, avoidance, and numbing), family functioning (comprised of family strength, community life, relationship permanence, family functioning, and living situation functioning), and affect driven,

externalizing symptoms (affect dysregulation, anger control, and danger to others). These factors entered the survival analysis as composites (i.e., sum of CANS scores comprising the factor). The remaining 17 CANS items—interpersonal strength, educational strength, well-being, optimism, talent/interest, spiritual/religious, developmental/intellectual functioning, medical functioning, school behavior, school achievement, school attendance, attachment difficulties, other self-harm, runaway delinquency, judgment, and fire setting—entered the survival analysis as individual item covariates. Eight demographics and service-related variables—highest CAPI score, age, sex, number of community-based services used prior to hospitalization, prior hospitalization history, custody status, living situation, and length of stay—also entered the survival analysis as covariates. Finally, the three interactions previously proposed—youth emotional/behavioral needs factor X family functioning factor, age X family functioning factor, traumatic stress symptoms factor X custody status—entered. Multicollinearity was investigated by examining the squared multiple correlations generated by PAF (see Table 24). Squared multiple correlations (SMC) are generated as initial communalities using this approach. Redundant covariates are those with initial communalities (SMC) greater than 0.90 (Tabachnick & Fidell, 2007). As seen in Table 24, none of the variables included in the survival analysis demonstrated conceptual or statistical multicollinearity; although both custody status (SMC=0.877) and living situation (SMC=0.877) were close to the cutoff. A logarithmic transformation reduced skewness and the influence of outliers for length of stay and the CANS item interpersonal strength and a square root transformation reduced skewness and the influence of outliers

for CANS items developmental/intellectual functioning, medical functioning, and other self-harm. Mahalanobis distance was used to assess multivariate outliers; none emerged.

Table 24. Assessing for multicollinearity of covariates entering the survival analysis

Covariate	Initial communality
Trauma factor	.722
Family factor	.821
Affect driven, externalizing factor	.801
Interpersonal strength	.650
Educational strength	.741
Well-being	.634
Optimism	.561
Talent/Interest	.735
Spiritual/Religious strength	.540
Developmental/IQ functioning	.555
Medical functioning	.693
School behavior	.594
School achievement	.686
School attendance	.800
Attachment difficulties	.708
Other self-harm	.753
Runaway	.600
Delinquency	.781
Judgment	.752
Fire setting	.395
Highest CAPI	.740
Age	.809
Sex	.641
Number of community-based services used	.574
Custody status	.877
Living situation	.877
Length of stay	.683
Prior hospitalization history	.468

Note. Redundant covariates are those with initial communalities greater than 0.90. CAPI=Acuity of Psychiatric Illness, Child and Adolescent Version.

Cox Regression Analysis of CANS, Demographic, and Service-Related Variables on Time to Psychiatric Rehospitalization

Fifty-one cases remained after listwise deletion of missing data and among these children, 23 experienced a rehospitalization (i.e., were right-censored). A forward conditional entry method was used to include covariates into the model. Of the 31 covariates tested in the model, four emerged as statistically significant predictors of psychiatric rehospitalization—square root of developmental/intellectual functioning, educational strength, fire setting, and hospitalization history. The proportionality assumption was tested for each of the significant predictors by plotting log-log Kaplan-Meier (KM) curves. The log-log survival plots provide a graphical approach for assessing the proportional hazards assumption, with parallel plots suggesting that the assumption is satisfied (Kleinbaum & Klein, 2005). None of the initial KM curves satisfied the proportionality assumption due to lack of parallelism and the presence of multiple overlapping curves. However, continuous variables or those with more than three categories typically fail to satisfy the proportionality assumption as multiple categories "thins out" the data (Kleinbaum & Klein, 2005, p. 143). Kleinbaum and Klein (2005) propose three recommendations when assessing the proportional hazards assumption: (1) that the number of categories be kept to either two or three, (2) that the choice of categories be as meaningful as possible, and (3) that the number of observations in each category be reasonably balanced.

As a result, modifications were made to the significant predictors. Each predictor was grouped into three or less categories and KM curves were re-run to test the

proportionality assumption. The square root of developmental/intellectual functioning was grouped into two categories—zero (no evidence) versus all others categories (i.e., mild, moderate, and severe impairment) combined. The KM curves were roughly parallel with the new categorization, suggesting that the proportional hazards assumption was met (Figure 10). Educational strength failed to satisfy the proportionality assumption when grouped into three categories (i.e., centerpiece strength, useful and identified strength, and no strength) or two categories (i.e., centerpiece strength versus all other categories combined and centerpiece strength and useful strength versus identified strength and no strength). Consequently, this variable was removed from the survival analysis. Fire setting was grouped into two categories—zero (no evidence) versus all others categories (i.e., mild, moderate, and severe impairment) combined. The KM curves were roughly parallel with the new categorization, suggesting that the proportional hazards assumption was met (Figure 11). Finally, prior hospitalization history was grouped into three categories (i.e., zero and one prior hospitalization, two prior hospitalizations, and three or more prior hospitalizations). Grouping the observations in this way created the most balanced categories, keeping with Kleinbaum and Klein's (2005) recommendations. The KM curves were roughly parallel with the new categorization, suggesting that the proportional hazards assumption was met (Figure 12).

Figure 10. Log-log Kaplan-Meier curve for the square root of the developmental/intellectual functioning item of the Child and Adolescent Needs and Strengths (N=190)

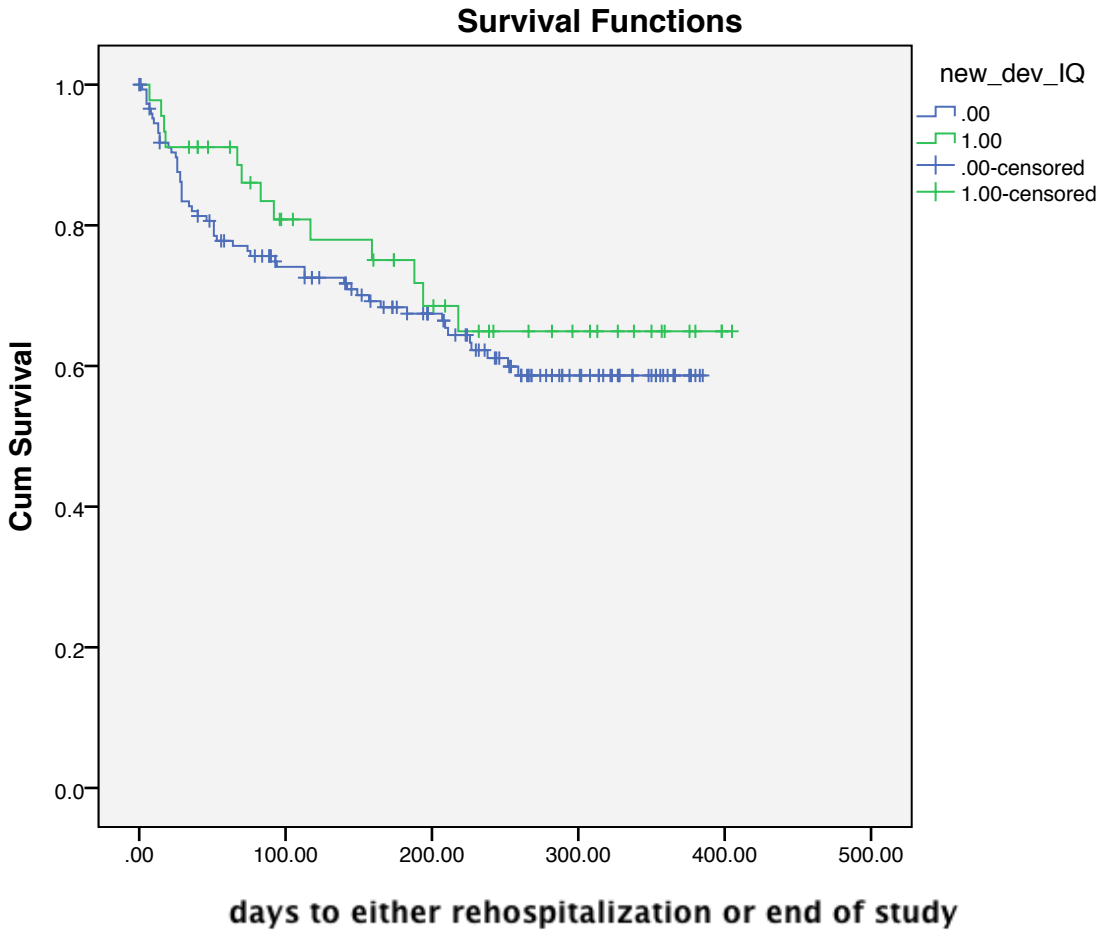


Figure 11. Log-log Kaplan-Meier curve for the fire setting item of the Child and Adolescent Needs and Strengths (N=190)

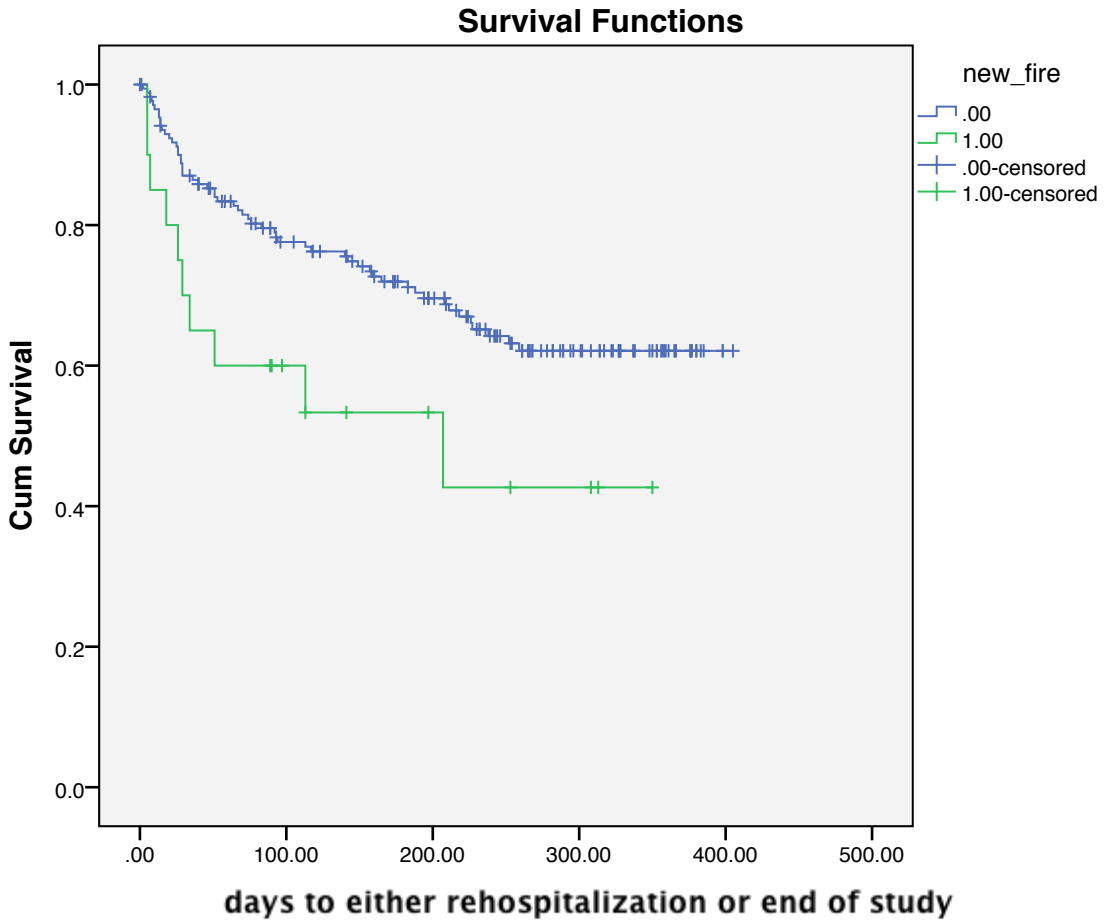
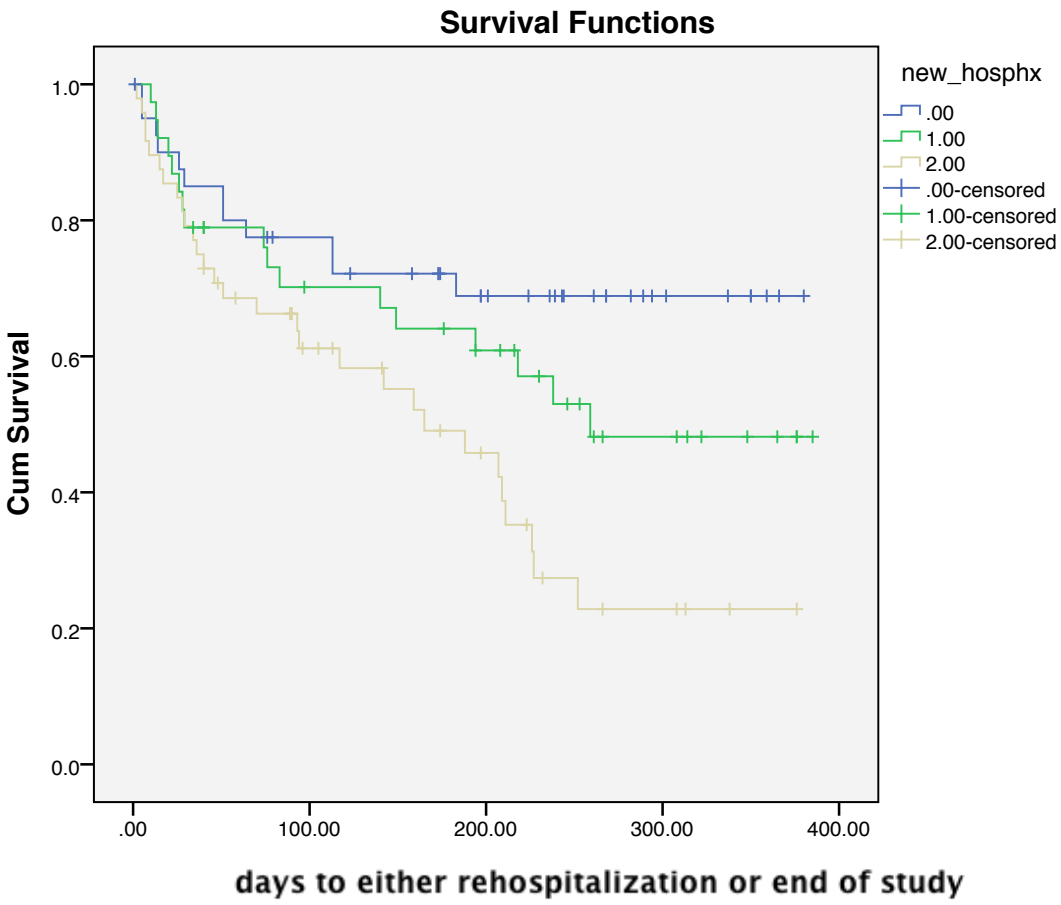


Figure 12. Log-log Kaplan-Meier curve for prior hospitalization history (*N*=190)



The modified square-root of developmental/intellectual functioning, fire setting, and prior hospitalization history variables were entered into a survival analysis with all other CANS, demographic, and service-related variables except educational strength (due to its failure to meet the proportionality assumption).

Of the 30 covariates tested in the model, prior hospitalization history was the only variable to reliably predict survival time; none of the demographics, CANS items, CANS factors generated using factor analysis techniques or interaction terms emerged as significant predictors. While several statistics are presented, the description of the results focuses on the relative risk statistics. Relative risk refers to the hazard ratio or the proportional increase or decrease in the risk of psychiatric rehospitalization associated with each unit increase in the independent variable. Table 25 shows regression coefficients, degrees of freedom, *p* values, and hazard ratios for the significant covariate. A move from a lower hospitalization category to the next higher grouping (e.g., from zero or one previous hospitalization to two prior hospitalizations) increases the odds of future psychiatric rehospitalization by 94%. At the mean of the covariates, the 100-day survival rate is just above 70% and the 200-day survival rate is about 45%.

Table 25. Cox regression analysis of CANS, demographic, and service-related variables on time to psychiatric rehospitalization (N=51)

Covariate	*B*	df	*p*	Odds Ratio
Hospitalization history	0.660	1	0.008	1.935

Note. The hospitalization history variable is the sum of the number of previous psychiatric inpatient hospitalizations at the study hospital and hospitals other than the study hospital. The three categories created for the prior hospitalization variable are as follows: zero or one prior hospitalization, two prior hospitalizations, and three or more prior hospitalizations. CANS=Child and Adolescent Needs and Strengths, *B*=beta, df=degrees of freedom.

Examination of differences between participants included and not included in the survival analysis. Due to missing data in the demographics and service-related variables, the sample size for the survival analysis including all 31 variables was reduced from 194 to 51. As a result, the model is significantly underpowered and all results should be considered preliminary and interpreted with caution. Independent samples t-tests and chi-squares tests were used to examine differences between those participants included in the survival analysis and those excluded due to missing data on variables in the survival analysis. Independent-samples t-tests revealed significant differences between groups for the number of community-based services used prior to hospitalization, with those not included (*M*=1.973) reporting a greater use of services than those included (*M*=1.558) in the analysis, and the number of days to rehospitalization or the end of the study period, with those not included (*M*=192.11) in the analysis demonstrating more days until psychiatric rehospitalization than those included (*M*=149.15). Chi-squares tests revealed significant differences between groups

for custody status, χ^2 (2, N=120)=10.65, p<0.001, with less youth adopted or in the child welfare system included in the analysis, and living situation, χ^2 (3, N=99)=8.30, p=0.040, with more youth living with a biological parent and less youth living in non-relative foster care included in the analysis.

Survival Analysis Excluding Service-Related Variables Not Included on the Intake Form

The majority of the missing data from the survival analysis including all CANS, demographics, and service-related variables came from the two service-related variables that were not included on the intake form—highest CAPI score and length of hospital stay. As a result, an additional survival analysis including only CANS variables demographics and service-related variables from the intake form as covariates was performed. Ninety-two cases remained after listwise deletion of missing data and among these children, 49 experienced a rehospitalization (i.e., were right-censored). A forward conditional entry method was used to include covariates in the model. Of the 29 covariates tested in the model, two emerged as statistically significant predictors of psychiatric rehospitalization—square root of developmental/intellectual functioning and hospitalization history. However, when modified versions of these variables that satisfy the proportional hazards assumptions were included in the survival analysis, hospitalization history was again the only variable to reliably predict survival time.

Table 26 shows regression coefficients, degrees of freedom, p values, and hazard ratios for each significant covariate. A move from a lower hospitalization category to the

next higher grouping (e.g., from zero or one previous hospitalization to two prior hospitalizations) increases the odds of future psychiatric rehospitalization by 77%. At the mean of the covariates, the 100-day survival rate is just above 75% and the 200-day survival rate is below 65%. Therefore, like the survival analysis including all covariates, increases in risk of psychiatric rehospitalization are associated with greater history of hospitalization, but demographics, CANS items, CANS factors generated using factor analysis techniques or interaction terms did not emerge as significant predictors.

Table 26. Cox regression analysis of CANS, demographic, and service-related variables on time to psychiatric rehospitalization, excluding service-related variables not included on the intake form (N=92)

Covariate	*B*	df	*p*	Odds Ratio
Hospitalization history	0.572	1	0.003	1.772

Note. The hospitalization history variable is the sum of the number of previous psychiatric inpatient hospitalizations at the study hospital and hospitals other than the study hospital. Highest CAPI score and length of stay were excluded from this analysis. The three categories created for the prior hospitalization variable are as follows: zero or one prior hospitalization, two prior hospitalizations, and three or more prior hospitalizations. CANS=Child and Adolescent Needs and Strengths, *B*=beta, df=degrees of freedom.

Examination of differences between participants included and not included in the survival analysis. Due to missing data in the demographics and service-related variables on the intake form, the sample size for the survival analysis including 29 variables was reduced from 194 to 92. As a result, the model is significantly underpowered and all results should be considered preliminary and interpreted with caution. Independent samples t-tests and chi-squares tests were used to examine

differences between those participants included in the survival analysis and those excluded due to missing data on variables in the survival analysis. Independent-samples t-tests revealed significant differences between groups for the number of community-based services used prior to hospitalization, with those not included (M=2.235) reporting a greater use of services than those included (M=1.645) in the analysis. Chi-squares tests revealed significant differences between groups for custody status, χ^2 (2, N=120)=78.20, p<0.001, with less adopted youth and more youth in the child welfare system or in the custody of a biological parent included in the analysis.

Survival Analysis Including Only CANS Covariates

Due to the extent that missing data reduced the sample size of the survival analysis including all CANS, demographics, and service-related variables, an additional survival analysis including only CANS variables as covariates was also performed. One hundred and ninety cases remained after listwise deletion of missing data and among these children, 125 experienced a rehospitalization (i.e., were right-censored). A forward conditional entry method was used to include covariates in the model. Of the 21 covariates tested in the model, fire setting was the only CANS item to reliably predict survival time. Fire setting remained a significant predictor when the survival analysis was re-run with the modified version of the variable that satisfied the proportionality assumption. A move from a lower fire setting category to the next higher grouping (i.e., no evidence/history of fire setting behavior to a history of fire setting behavior) increases the odds of psychiatric rehospitalization by about 110% for youth with the higher score.

Table 27 shows regression coefficients, degrees of freedom, *p* values, and hazard ratios for each significant covariate. At the mean of the covariates, the 100-day survival rate is just above 75% and the 200-day survival rate is about 70%. Therefore, fire setting predicted survival time when only CANS variables are included as covariates.

Table 27. Cox regression analysis of CANS variables on time to psychiatric rehospitalization (N=190)

Covariate	*B*	df	*p*	Odds Ratio
Fire setting	0.745	1	0.031	2.107

Note. The two categories created for the fire setting variable are as follows: no evidence of impairment and mild, moderate, and severe impairment combined. CANS=Child and Adolescent Needs and Strengths, *B*=beta, df=degrees of freedom.

Examination of differences between participants included and not included in the survival analysis. Independent samples t-tests and chi-squares tests were used to examine differences between those participants included in the survival analysis and those excluded due to missing data on variables in the survival analysis. No significant differences emerged.

CHAPTER FIVE

DISCUSSION

This study examined the impact of individual youth and social ecological system variables on time to inpatient psychiatric rehospitalization in a sample of youth being discharged from a private inpatient psychiatric hospital. Given rising rates of youth psychiatric rehospitalization (Case et al., 2007; Romansky et al., 2003) and the current emphasis on community-based mental health services, research examining predictors of inpatient hospitalization is needed to identify factors that promote community tenure. Moreover, given that inpatient psychiatric hospitalization is already the clinical intervention with the weakest evidence base (Burns et al., 1999; James et al., 2010), the rising rehospitalization rates cast further doubt on the quality and efficacy of inpatient treatment and raise the question of whether inpatient and community-based services are communicating and working together to effectively meet the mental health care needs of youth and their families (Burns & Hoagwood, 2002; Lyons, 2001).

Previous research with this population has examined the impact of numerous variables on readmission to inpatient psychiatric care, but lacks a consistent theoretical approach to outcomes monitoring. Furthermore, the results of the extant literature have been inconsistent and, at times, contradictory. The application of social ecological theory used in this study lays the theoretical groundwork necessary to examine the impact

of both clinical and non-clinical factors across systems of influence in a comprehensive fashion. Additionally, the current literature base largely defines rehospitalization as a dichotomous outcome—readmission or no readmission—failing to capture an often-identified goal of extending time between hospitalizations for youth with complex multisystem stressors. The statistical analysis approach used in this study, survival analysis, utilized time to rehospitalization as the outcome and identified individual youth and greater social ecological system variables associated with community tenure.

This study also evaluated the utility of the CANS for the population of youth hospitalized in psychiatric inpatient facilities. Due to the cost and restrictiveness of inpatient hospitalization, it is essential that inpatient services are appropriately monitored and managed (Bisnaire & Greenham, 2009; Blanz & Schmidt, 2000; Stroul & Friedman, 1986). Confirmatory and exploratory factor analysis strategies were used in an attempt to confirm a social ecological theory-informed factor structure of the CANS and to create a shorter, more applicable version to use in the inpatient milieu. This section highlights the key findings from each proposed hypothesis (see Table 28 for results related to the hypotheses explored in this study) and identifies the immediate implications of the findings. Finally, limitations of the present study and future directions for research are presented.

Table 28. Support for hypotheses

Hypothesis	Finding
Hypothesis 1a: A CANS measurement model consisting of six factors (youth strengths, youth capacity, youth emotional/behavioral needs, traumatic stress symptoms, family functioning, greater social ecological system functioning) will provide good fit to the data as determined by goodness of fit indices	Not supported
Hypothesis 1b: The six-factor model will provide better fit to the data than a one-factor model as determined by a chi-square differences test	Supported
Hypothesis 1c: The six-factor oblique model will provide better fit to the data than a six-factor orthogonal model as determined by a chi-square differences test	Supported
Hypothesis 1d: The six-factor model will provide better fit to the data than the five-factor model proposed by the author of the CANS as determined by a chi-square differences test	Supported
Hypothesis 2: The three factor analysis strategies used in this study—CFA, PCA, and PAF—will converge with regard to the number of factors revealed and the items composing these factors	Not supported
Hypothesis 3a: The following individual youth variables will predict faster time to rehospitalization: high youth emotional/behavioral needs, high symptom severity at intake, low youth strengths, low youth capacity, younger age at intake	Partially supported
Hypothesis 3b: The following family system variables will predict faster time to rehospitalization: low family functioning, child welfare custody status, non-biological parent living arrangement	Not supported
Hypothesis 3c: The following greater social ecological system variables will predict faster time to rehospitalization: low greater social ecological system functioning, greater history of previous inpatient hospitalizations, reduced LOS, less utilization of community-based mental health services	Partially supported
Hypothesis 4a: The latent variable family functioning will moderate	

the relationship between the latent variable youth emotional/behavioral needs and time to rehospitalization, with high emotional/behavioral needs predicting quicker rehospitalization for youth with low family functioning	Not supported
Hypothesis 4b: The latent variable family functioning will moderate the relationship between age and time to rehospitalization, with younger age predicting quicker rehospitalization for youth with high family functioning	Not supported
Hypothesis 4c: Child welfare status will moderate the relationship between the latent variable traumatic stress symptoms and time to rehospitalization, with high symptoms of traumatic stress predicting faster time to rehospitalization for youth in the child welfare system	Not supported

Note. CANS=Child and Adolescent Needs and Strengths, CFA=Confirmatory Factor Analysis, PCA=Principal Components Analysis, PAF=Principal Axis Factoring.

Utility and Factor Structure of the CANS in a Psychiatric Inpatient Setting

Although the authors of the CANS suggest that dimension scores can be used as a valid outcome measurement strategy (Lyons, 1999), there is a dearth of research evaluating the psychometrics of the CANS factor structure. Additionally, since the CANS was developed at the item level and clinicians are able to modify the measure to meet the specific needs of the service provision culture (Lyons, 1999), it is important that the utility of the tool is examined in each treatment milieu. To date, the CANS has not been evaluated in an inpatient psychiatric setting. Therefore, in order to fill the gap in the literature, various factor analysis strategies were used to assess the structure of the CANS using a sample of youth being discharged from a private psychiatric hospital.

CANS Factor Structure

Model comparison using confirmatory factor analysis. Confirmatory factor analysis was used to examine four different factor structures: (1) a global, one-factor model, (2) an oblique, six-factor model based on social ecological theory, (3) an orthogonal version of the same six-factor model based on social ecological theory, and (4) an oblique, five-factor model proposed by the author of the CANS. Analyses were done two ways, with a traditional maximum likelihood (ML) approach as well as with a Weighted Least Squares (WLS) approach, to account for the four-point Likert scale used in the CANS, which could be interpreted as an ordinal scale of measurement due to its quantification of needs and strengths. Hypothesis 1a was not supported as none of the tested models demonstrated good fit with regard to the relative and absolute fit indices using either the ML or WLS approach (see Table 28 for review of all hypotheses and degree of support they received in the study). However, CFA using the ML technique revealed that the oblique, six-factor model, consisting of a youth strengths factor, youth capacity factor, youth emotional/behavioral needs factor, traumatic stress symptoms factor, family functioning factor, and greater social ecological system functioning factor, had significantly better fit compared to the global, one-factor model, the orthogonal, six-factor model, and the oblique, five-factor model, supporting hypotheses 1b-1d. However, it is important to note that although the oblique, six-factor model demonstrated significantly better fit than the other models proposed, its fit statistics were not within the acceptable range. Models using the WLS method cannot be compared using the chi-square differences test. Results of the parallel analysis using the PCA model with

promax rotation also supported the six-factor oblique model as the model with the best fit to the data.

Preliminary support for a multi-factor, oblique model of the CANS is consistent with the tenets of social ecological theory, which propose that youth are nested within a network of separate, yet interrelated social ecologies. These results are also consistent with previous research in the pediatric psychology literature that conceptualizes the dynamic influence between children with chronic illnesses and health care providers, the family system, peers, and schools within the social ecological framework (e.g., Kazak, Rourke, & Navsaria, 2009; Power, DuPaul, Shapiro, & Kazak, 2003). These results add to the literature by demonstrating an underlying factor structure consistent with social ecological theory specifically in the context of child inpatient hospitalization.

The finding that the six-factor model based on social ecological theory provided better fit than the five-factor model proposed by the author of the CANS (hypothesis 1d) provides support for a social ecological approach to understanding youth mental health. The five-factor model of the CANS (see Figure 2) roughly follows a traditional mental health outcomes model, which is the predominant model used by outcomes tools such as the Mental Health Index (see Howard, Brill, Lueger, O'Mahoney, & Grissom, 1995; Howard, Orlinsky, & Leuger, 1995; Sperry, Brill, Howard, & Grissom, 1996) and Outcome Questionnaire-45 (OQ-45; Lambert, Kahler, Harmon, Burlingame, & Shimokawa, 2011) in the psychotherapy outcomes literature. The traditional mental health outcomes model utilizes categories of items (e.g., functioning, symptoms, and risks); however, with the CANS there is the addition of a strengths category. The

categorical nature of the traditional mental health outcomes model parallels diagnostic criteria and organizes domains without accounting for the context in which these functions occur. On the other hand, the model grounded in social ecological theory (see Figure 1) organizes domains based on the environment of influence. The superior fit of the proposed six-factor model suggests that a social ecological conceptualization is better at capturing youth social and emotional functioning than a traditional mental health outcomes model. This study represents the first effort to psychometrically compare models structured according to social ecological theory with a more traditionally organized mental health model.

The findings of this study related to support for a multi-factor, ecologically driven structure of the CANS for this population of youth call attention to the need for the future investigation of the influence of social ecological systems on the social and emotional functioning of youth utilizing psychiatric hospitalization. Given the prominence of the system of care philosophy in the present service environment, which proposes that a coordinated network of community-based services, tailored to meet the unique social and emotional needs of individual children and families in the least restrictive environment possible is best to serve youth with serious emotional disturbances (Huang et al., 2005; Pumariega & Winters, 2003; Stroul & Friedman, 1986), it is nevertheless true that inpatient hospitalization exists and is utilized by youth at risk of harm to themselves and/or others. Inpatient hospitalization, like residential treatment, is at odds with the system of care philosophy as it removes youth from the community and places them in a highly restrictive and structured environment (Lyons, Woltman, Martinovich, &

Hancock, 2009). The preliminarily support for a multi-factor, ecologically driven structure of the CANS for youth utilizing inpatient hospitalization reflects the interrelationship in the data across systems of influence and provides support for a social ecological organization of domains, but fails to clarify how these domains relate to inpatient utilization. Therefore, future research is needed to explore how variables across the coordinated, community-based service networks serving youth contribute to the need for psychiatric hospitalization and rehospitalization.

Convergence of confirmatory and exploratory factor analysis strategies. Hypothesis 2 was not supported as the three factor analysis strategies—CFA, PCA, and PAF—did not converge with respect to the number of factors extracted and the items comprising these factors. Although comparison of CFA using the ML technique supported the six-factor, oblique model as having the best fit to the data, the exploratory factor analysis approaches—PCA and PAF—did not. Results of both the PCA and PAF with promax rotation suggested retaining either two or seven components. As previously stated, the parallel analysis of the PCA with promax rotation suggested that six components be retained, both when normal data and raw data permutations were generated, providing further support for retaining the six-factor oblique model.

Although the three factor analysis strategies employed in this study did not converge, three clusters of CANS items consistently emerged as loaded onto the same factor across extraction approaches. The first of these clusters contained the items adjustment to trauma, re-experiencing trauma, avoidance, and numbing, which provides support for the proposed traumatic stress symptoms factor. The second consists of the

items family strengths, family functioning, and living situation functioning. Although three of the items proposed to be included in this family functioning factor did not consistently align with the others (i.e., interpersonal strength, relationship permanence, and attachment difficulties). It is possible that the inclusion of youth in the child welfare system in this sample may have played into why the relationship permanence and attachment difficulties items did not align with the other family-focused factors. The inconsistency of living environments experienced by youth in the child welfare system interferes with relationship permanence and disrupts healthy attachment to caregivers. With regard to interpersonal strength, the age range of the sample (four through 12 years old) spans early childhood through early adolescence. The internalization of familial interpersonal patterns would be different across childhood. However, the consistency of family strengths, family functioning, and living situation functioning loading onto the same component provides support for a family functioning factor. Finally, affect dysregulation, anger control, and danger to others consistently hung together across extraction techniques. This study proposed a broad youth emotional/behavioral needs factor, composed of these factors as well as substance abuse, other self-harm, fire setting, runaway, delinquency, somatization and judgment. The finding that only the CANS items affect dysregulation, anger control, and danger to others consistently loaded onto the same factor suggests an affect driven, externalizing symptoms factor for the CANS, rather than a broader emotional/behavioral needs factor. The low rate of some of the needs factors proposed (e.g., substance abuse, other self-harm), likely contributed to inconsistencies across extraction techniques. Alternatively, it may be that an affect

driven, externalizing symptoms factor including affect dysregulation, anger control, and danger to others is unique to inpatient treatment, which provides psychiatric stabilization for youth experiencing florid psychopathology and/or at risk of harming themselves or others.

Lessons Learned Regarding Clinician Sampling of Items from an Existing Measure

Due to its design at the item-level, the creators of the CANS encourage clinicians to pick and choose items and domains that are relevant to the treatment environment in which they practice. This flexibility allows clinicians to create an assessment tool designed to meet the unique needs of the population served and the goals of the specific treatment milieu. In this study, an abbreviated version of the CANS was created to capture the needs and strengths of youth served in an inpatient psychiatric hospital. Despite the potential clinical utility of allowing for flexibility in item selection, there are a number of content and construct validity related issues that result from use of a selection of items for an established measure, as is done with the CANS. Although the CANS was created at the item-level, it was designed to provide a robust picture of functioning by measuring specific domains relevant to the social and emotional functioning of youth and their families (i.e., life domain functioning, youth strengths, acculturation, caregiver strengths and needs, youth behavioral/emotional needs, and youth risk behaviors). Each item was included to account for a different aspect of youth mental health (Lyons, 1999). When facets of the construct of youth mental health are excluded in modified versions of the CANS the proportional representation of items is skewed and the assessment of the targeted construct is incomplete. For example, despite

the documented evidence of the association between family system factors and rehospitalization (e.g., Blader, 2004; Brinkmeyer et al., 2004; Fite et al., 2009) the caregiver needs and strengths domain was not included in the modified version of the CANS used in this study. As a result, the impact of caregiver factors on the mental health of youth was not accounted for, yielding an incomplete assessment of youth mental health that is skewed to account for the influence of individual youth factors. The flexibility of the CANS has led to the creation of dozens of versions of this measure, each designed to attend to the needs of the clients served in a specific treatment environment. However, content validity cannot be assumed to be unconditional; it can vary across populations (Nunnally & Bernstein, 1994; Suen, 1990), especially when an assessment tool is used in populations as diverse as mental health, juvenile justice, and child welfare, as is the case with the CANS. Therefore, it is essential that validity be established for the population being sampled and the intended function of the tool (Haynes, Richard, & Kubany, 1995). Although modified versions of the CANS all contain CANS variables, they include a unique constellation of items, are used with different populations of youth, and serve various functions. As a result, comparisons across modified versions are inappropriate. A total CANS score on one facility's version of the CANS cannot be compared and contrasted with another facility's version unless the facilities are using the exact same version of the CANS and for the same function, which compromises communication of the clinical needs and strengths of youth amongst service providers. Therefore, despite the ease of clinical sampling of the CANS to customize the assessment tool to meet the needs of a specific sample and function, results of this study point to the

limitations of this approach. Psychometric analyses must be used for the refinement of assessment instruments to insure that validity is not compromised (Haynes et al., 1995). Confirmation of the validity of the assessment measure is essential to insure that the tool is indeed measuring the construct under investigation and that the clinical inferences made as a result of the assessment are well supported.

Predictors of Time to Rehospitalization

Survival analysis was used to explore the influence of a number of individual youth, family, and greater social ecological system predictors on time to youth psychiatric inpatient rehospitalization. Hypothesis 3a was partially supported as the fire setting item of the CANS, initially predicted to be a part of the youth emotional/behavioral needs latent variable, significantly predicted time to rehospitalization in a survival analysis using only CANS items, with a greater history of fire setting predicting faster rehospitalization. Fire setting is a disruptive behavior that presents a risk of harm to both self and others. As danger to self or others is one of the primary admission criteria to inpatient psychiatric care, fire setting emerging as a predictor of psychiatric rehospitalization is not surprising. Additionally, this finding is in line with the literature, which identifies disruptive behavior disorders as the psychiatric diagnosis with the strongest evidence of a relationship with youth psychiatric rehospitalization (Blader, 2004; Chung et al., 2000) and supports Newton and colleagues' (2000) research documenting the causal relationship between externalizing behavior and placement instability (rehospitalization representing a placement disruption). This finding suggests that discharge planning following inpatient treatment should attend

specifically to this risky behavior for youth with a history of fire setting. Discharge should include psychoeducation for parents/guardians and safety planning in the home to reduce access to implements such as matches and lights, making it more difficult for youth to engage in fire setting behaviors, which would interfere with community tenure. However, it is important to note that fire setting did not emerge as a significant predictor of time to psychiatric rehospitalization in the other survival analyses that included demographics and service-related variables. The sample that included variables outside of CANS items (*N*=51 and 92) was significantly smaller than that used for the survival analysis that included only CANS items (*N*=190). It may be that variability on the fire setting item of the CANS was restricted in the smaller sample or that the fire setting item shared variance with another demographics or service-related variable, reducing its predictive effect. None of the other individual youth factors—high symptom severity at intake, low youth strengths, low youth capacity, and younger age at intake—were significant predictors of time to rehospitalization. Missing data regarding demographic data and CAPI scores may have contributed to the lack of findings related to symptom severity and age. The sample for this study was treated in the ACT Unit of the inpatient hospital. Children with developmental disabilities were treated in a separate inpatient unit and significant medical issues and the presence of physical disabilities was exclusionary criteria for treatment on the ACT Unit. Therefore, the variability of items in the youth capacity factor was restricted in this sample. As for youth strengths, the sample used in this study ranged in age from age four to twelve. Research supporting this

hypothesis was done using an adolescent sample (see Enns et al., 2003). Youth strengths components, such as optimism and self-efficacy, may not be developed in a child sample.

Hypothesis 3c was also partially supported as a greater history of previous psychiatric hospitalization significantly predicted faster time to rehospitalization. This finding is consistent with previous research documenting the relationship between youth inpatient treatment history and rehospitalization (e.g., Bickman et al., 1996; Chung et al., 2008). Prior hospitalization history emerged as the only significant predictor of time to psychiatric rehospitalization in both of the survival analyses in which it was included as a covariate (i.e., the survival analysis including all demographics, service-related, and CANS variables and the survival analysis with all variables included on the intake form and CANS variables). Chung and colleagues (2008) suggested that the relationship between prior hospitalization history and rehospitalization may be the result of this subgroup of youth having more severe psychiatric problems to begin with, resulting in a need to utilize acute inpatient services quicker than other youth discharged. The results of this study do not support that proposal, as total CAPI score did not emerge as a significant predictor of return to hospital. Alternatively, Foster (1999) suggested that the relationship between prior hospitalization history and rehospitalization might be due to failure of community-based aftercare services to meet the psychiatric needs of the youth. Unfortunately, his study did not assess for the use of aftercare services following discharge. However, parent/guardians reported usage of community-based services prior to hospitalization, as indicated on the intake form, was included as a variable in the

survival analyses, providing a measure of use of community-based services, and did not emerge as a significant predictor of time to rehospitalization.

Research suggests that once a youth has experienced inpatient psychiatric hospitalization the threshold for rehospitalization is lowered, both for providers in the community serving youth discharged from inpatient care (Romansky et al., 2003) and for the parent/guardian consenting to hospitalization (Blader, 2004). Comprehensive discharge planning following inpatient hospitalization puts youth and families in greater contact with mental health providers in the community (e.g., individual psychotherapy with a licensed clinical psychologist or clinical social worker, medication management with a psychiatrist). This increased contact presents regular opportunities for care providers to assess the psychiatric status of the youth, notice symptom escalation, and identify the need for psychiatric stabilization in an inpatient facility when appropriate. There is evidence that the threshold for rehospitalization is also influenced by the youth's discharge placement. Romansky and colleagues (2003) found that the threshold for readmission to psychiatric inpatient care was lower for youth in congregate care, when compared to youth residing with a caregiver. Additionally, some residential treatment facilities have been found to make low-risk (i.e., no suicidal ideation for at least seven days, had not displayed dangerous behavior for at least seven days, and had displayed at most mild signs of disordered thinking) psychiatric referrals that fail to meet clinically appropriate psychiatric hospital admission criteria (Leon et al., 2000). Parents who experienced relief (defined as a reduction in measured parental stress) during the psychiatric hospitalization of their child also demonstrate a lower threshold for

rehospitalization when compared to parents who experienced no relief or an increase in stress during the psychiatric hospitalization of their child (Blader, 2004). Alternatively, parents/guardians may be more open to utilizing inpatient hospitalization following a positive past experience with the treatment milieu and a consistent relationship with a mental health professional in the community that was made possible due to discharge planning from the inpatient facility. The finding that youth with a greater history of previous psychiatric hospitalization rehospitalize quicker than youth with less of/no history of psychiatric hospitalization paired with literature suggesting that caretakers and service providers have a lower threshold for psychiatric readmission suggests that inpatient facilities need to serve as gatekeepers for inpatient hospitalization in order to insure that all admissions are appropriate, especially for youth with a hospitalization history who may be desensitized to the admission process. Inpatient facilities provide intensive care services in the form of crisis stabilization and psychiatric assessment (Leon, 2009; Sharfstein, 2009) and are only appropriate for youth experiencing florid psychopathology who are a danger to themselves and/or others. The limited availability of inpatient beds (Blanz & Schmidt, 2000) further stresses the importance of inpatient facilities monitoring and managing inpatient admissions to insure that space is available for youth in need of these acute services.

Hypothesis 3b was not supported as none of the family system variables significantly predicted time to psychiatric rehospitalization. Although the CANS assesses for functioning across the ecologies of the child, the sampling of items used in the present study provided only a basic understanding of and a limited insight into family

functioning. This version of the CANS did not include the caretaker needs and strengths scale, which would have provided a more nuanced look at the family system and allowed clinicians to examine domains such as caregiver involvement, knowledge about the youth, social resources, and supervision, all essential components to maintaining community tenure. Additionally, a Master's level direct care provider and not the parent/guardian complete the CANS. Despite the benefits of using an objective rater to assess and provide an unbiased account of the functioning of a system, this rater's knowledge is restricted to the information provided through the parent/guardian interview and chart review, making it difficult, if not impossible, for him/her to have a comprehensive understanding of the family dynamics at work in the complex and multi-stressed families utilizing inpatient psychiatric care. As a result, the CANS raters may have underreported family system needs and obscured any relationship between family system variables and time to psychiatric rehospitalization.

Additionally, none of the moderation hypotheses were supported (i.e., hypotheses 4a-c). The interaction terms—family functioning latent variable X youth emotional/behavioral needs latent variable, family functioning latent variable X age, child welfare status X traumatic stress symptoms latent variable—did not emerge as significant predictors of time to psychiatric rehospitalization in any of the survival analyses. However, the family functioning and age interaction and child welfare status and traumatic stress symptoms interaction were only tested in the first two survival analyses since the final survival analysis only included CANS variables. The lack of support for the moderation hypotheses may also have been due to the fact that the proposed latent

variables did not hold up as robustly as hypothesized when subjected to the various factor extraction techniques and none were found to be significant predictors in the survival analyses. Additionally, youth in the child welfare system were included in this sample. Unfortunately, the family-focused items of the CANS did not specify whether items in the family functioning latent variable should be rated with respect to the child's biological or foster family. Inconsistencies across raters may have interfered with these interaction terms.

Selection of CANS Items for the Inpatient Hospitalization Milieu

The CANS was created at the item-level, allowing clinicians the flexibility of picking and choosing the items that best serve their treatment climate. This study is the first to date to investigate the utility of the CANS in a psychiatric inpatient hospital setting for youth. The 34 items chosen for the abridged version of the CANS used for this study were selected due to their relevancy to the population under investigation and uniqueness, when taking into account the other measures and demographic information obtained. However, five items (legal functioning, physical functioning, substance abuse, dissociation, somatization) emerged with a strong positive skew and extremely low variability (i.e., greater than or equal to 90% of cases indicated "no evidence of any needs"), suggesting that these items may not be relevant to the sample or the population of psychiatrically hospitalized youth as a whole. The sample, which ranged in age from four to 12, was likely too young to evidence a significant subgroup of youth with issues related to altercations with the law or substance use. The physical functioning item takes into account impairments in hearing, vision, and motor activity, as well as, treatable

medical conditions such as asthma. As these conditions are not found in the majority of youth, it follows that this item would have a strong positive skew in the inpatient population, as well as the general public. As for dissociation and somatization, this study analyzed the CANS at discharge. These symptoms may be a focus of treatment during hospitalization and, therefore, not prevalent in the sample at discharge, resulting in a strong positive skew. Regardless of why, the low variability and strong positive skew of these items suggests that these particular may not be well suited for this treatment climate, particularly at discharge.

Limitations and Future Directions

Although this study extends the current literature by applying social ecological theory to the study of youth inpatient hospitalization, examining the use of the CANS in the youth psychiatric inpatient population, and identifying predictors of psychiatric rehospitalization of youth, it has several limitations. The primary limitation is the sample size. Analyses examining the factor structure of the CANS and identifying predictors of time to psychiatric rehospitalization were underpowered, which reduced the ability of these statistical analyses to detect an effect, if the effect actually exists. Additionally, the low sample size prevented split sample confirmation of the CFA. Ideally the sample would be large enough to be split, so that one half of the sample could be used to identify the factor structure and the second half of the sample could be used to replicate the findings of the CFA and confirm the factor structure in an independent sample. Unfortunately, this study's sample was significantly undersized, approximately 200 participants short for this approach. Also, with regard to the content of the data used for

this study, there was a significant amount of missing intake form data. The intake form was used to gather information regarding demographics and service-related variables (e.g., prior hospitalization history, use of community-based services). Missing data in these areas compromised the power of the survival analyses, as list-wise deletion techniques were used for the survival analysis, and resulted in the exclusion of two of the interaction terms for the final survival analysis (i.e., family functioning latent variable X age, child welfare status X traumatic stress symptoms latent variable) due to the inclusion of a demographics variable. Future research should collect a larger, more complete sample, especially with regard to demographics and service-related factors to increase power, improving the ability of the analyses to detect significant predictors of time to psychiatric rehospitalization across the social ecologies of youth, to allow for split sample confirmation of the factor structure of the CANS, generalizing the results, and to further investigate the influence of demographics and service-related factors, as well as the interactive effects of variables across the social ecologies of youth on time to psychiatric rehospitalization.

A second limitation is the use of the CANS to measure predictors of time to psychiatric rehospitalization. An abridged, 34-item version of the CANS was used for this study. The items were selected to assess functioning across ecological system factors in a population of youth utilizing psychiatric inpatient services and to avoid redundancy with other assessment tools (e.g., CAPI) used in the intake and discharge process. Despite best efforts to select items relevant to the sample population, five items (legal functioning, physical functioning, substance abuse, dissociation, and somatization) were

consistently dropped from analyses due to low variability, suggesting that these items may not be pertinent to the sample or the population of psychiatrically hospitalized youth as a whole. Additionally, numerous items and domains that, at face value seem particularly relevant to this population were not included. For example, the entire caregiver strengths and needs domain was dropped from the version of the CANS used in this study. This domain assesses the caregiver's ability to care for the youth, including managing behavior and supporting the implementation of needed services. Caring for a child with serious mental health needs is a significant source of stress for parents and caregivers (Angold et al., 1998; Brannan & Heflinger, 2001; Taylor-Richardson, Heflinger, & Brown, 2006; Vaughan, Feinn, Bernard, Brereton, & Kaufman, 2013). There is evidence in the literature that caregiver burden and parenting stress impact the health and functioning of children by affecting the caregiver's parenting abilities (American Academy of Pediatrics, 2003; Deater-Deckard, 2004) and that perceived caregiver burden is associated with greater odds of psychiatric hospitalization (Bickman et al., 1996). Knowledge of functioning in the caregiver domain, specifically information regarding caregiver burden and parenting stress, would have been particularly relevant to this study of rehospitalization, as caregivers hold primary responsibility for attending to the complex social and emotional needs of youth discharged to the community and their cooperation and involvement is integral to maintaining community tenure. Future research should include measures of caregiver functioning and capacity, such as the Parenting Stress Index (PSI; Abidin, 1995) and the Caregiver Strain Questionnaire (Brannan, Heflinger, & Bickman, 1997), to assess the caregiver's ability and readiness to

support the youth following discharge. A final limitation regarding the use of the CANS is that it is a single-informant measure, completed by a clinical social worker at both intake and discharge to the hospital. Although the rater completes the measure in an interview format with the parent/guardian, the CANS is subject to clinical judgment; the ratings made by the clinical social worker are an interpretation of the parent/guardian's response to the items. Use of a single informant provides only one perspective. Future research should include both parent and teacher reports, in addition to milieu providers, in order to assess youth behavior across contexts and to explore environmental variables, such as family and school functioning, in a more comprehensive fashion. Additionally, youth report measures should also be used, especially when assessing internalizing symptomatology, in order to understand the youth's perception of his/her social, emotional, and behavioral functioning.

Third, a single item measured each of the variables included in the analyses. Although there is evidence of unique variability in the individual items within the subscales of the CANS (Miller, Leon, & Lyons, 2007) and the ability of single clinical variables of the CAPI to predict trajectories of acuity scores (Leon, Stoner, Lyons Usher, & Carey, 2013), use of a multi-item measure of the domains assessed would increase reliability and validity of the results found. Using a single item to determine the quality of community life does not provide a nuanced understanding of how community-related factors, such as availability and quality of resources and services, are contributing to rehospitalization. Future studies should employ multi-item assessments across the social

ecologies of youth (family, school, and community) to create a more inclusive picture of how functioning across domains influences the social and emotional well being of youth.

Fourth, data for this study was collected over the course of 12 months on a rolling basis. As a result, the maximum follow-up window possible for youth included in the study was less than 12 months. Although the vast majority of rehospitalizations take place in the first three months following discharge (Blader, 2004) and survival analysis takes into accounts cases that do not rehospitalize as censored cases, the results presented may be an underestimate of rehospitalization rates due to the short follow-up period.

Fifth, information regarding potentially significant predictors, namely use of psychotropic medication and aftercare services, was not included in this study. Psychotropic medication is increasingly used to treat mental illness (Case et al., 2007) and closely monitored medication management is one of the key services provided by inpatient psychiatric facilities during care. Future research should investigate the influence of psychotropic medications on community tenure following discharge from an inpatient facility. There are mixed findings in the literature examining the relationship between aftercare services and rehospitalization (Blader, 2004; Foster, 1999; James et al., 2010; Pavkov et al., 1997; Romansky et al., 2003). In this study, intake information was used to assess service-related variables; therefore, information regarding use of community-based services was restricted to prior to hospitalization. Future studies should continue to include information regarding use of aftercare services to attempt to clarify the relationship between post-discharge service and rehospitalization and to

determine if specific services (e.g., medication management by a psychiatrist) are significant predictors of time to rehospitalization.

A final limitation of this study involves its scope. Information was gathered from a single hospital, making the results of this study difficult to generalize. Future studies should compare predictors across inpatient psychiatric facilities as the services offered during hospitalization may vary by facility and other variables may influence return to the hospital in other areas of the country. Additionally, the study of a single hospital compromises the ability of this study to accurately identify the rehospitalization rate. Although youth discharged from this facility typically rehospitalize there, is possible that youth may rehospitalize at a hospital other than the one investigated (e.g., if the youth moves out of the area). Future research should include more facilities and/or employ follow-up strategies that involve contacting families and inquiring about rehospitalization to get a more accurate picture of the rehospitalization rate and factors influencing community tenure.

Conclusions

Despite the aforementioned limitations, the present study makes several important contributions to the literature. First, by using the framework of social ecological theory, this study lays the foundation for a systematic and comprehensive examination of the variables across the social ecologies of youth that influence their mental health status and ability to reside in the community. Second, this study examines rehospitalization as a continuum, rather than a dichotomous outcome. By conceptualizing rehospitalization in this way, this study attends to the psychiatric complexities of the population utilizing

inpatient services and allows for the goal of increasing community tenure rather than strictly adhering to a goal of not returning to the hospital. Third, although there was only limited support for the application of theoretical model to the factor structure of the CANS, findings from this study do suggest a model of youth social and emotional functioning that is comprised of multiple, but inter-related components and some preliminary support the use of the CANS in a sample of youth utilizing psychiatric inpatient services. Finally, the lack of convergence of factor structures of the CANS and limited number of significant findings related to predictors of time to psychiatric hospitalization highlights the heterogeneity of the population utilizing psychiatric inpatient care and points to the need for future research identifying evidence-based assessment tools for use in this treatment milieu and examining factors across the social ecologies of youth that promote psychiatric stabilization and community tenure.

APPENDIX A

SELECTION FROM COMPREHENSIVE CANS MANUAL

1/31/2008

CHILD AND ADOLESCENT NEEDS AN D STRENGTHS (CANS)

COMPREHENSIVE MULTISYSTEM ASSESSMENT

Manual

A large number of individuals have collaborated in the development of the CANS-Comprehensive Along with the CANS versions for developmental disabilities, juvenile justice, and child welfare, this information integration tool is designed to support individual case planning and the planning and evaluation of service systems. The CANS-Comprehensive is an open domain tool for use in service delivery systems that address the mental health of children, adolescents and their families. The copyright is held by the Praed Foundation to ensure that it remains free to use. For specific permission to use please contact the Foundation. For more information on the CANS-Comprehensive assessment tool contact:

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Coding Definitions

For **Need items**, the following categories and symbols are used:

0 indicates a dimension where there is no evidence of any needs. This may be a strength.
1 indicates a dimension that requires monitoring, watchful waiting, or preventive activities.
2 indicates a dimension that requires action to ensure that this identified need or risk behavior is addressed.
3 indicates a dimension that requires immediate or intensive action.

LIFE DOMAIN FUNCTIONING

Check* FAMILY** *Please rate the highest level from the* ***past 30 days
0 Child is doing well in relationships with family members.
1 Child is doing adequately in relationships with family members although some problems may exist. For example, some family members may have some problems in their relationships with child.
2 Child is having moderate problems with parents, siblings and/or other family members. Frequent arguing, difficulties in maintaining any positive relationship may be observed.
3 Child is having severe problems with parents, siblings, and/or other family members. This would include problems of domestic violence, constant arguing, etc.

Check* LIVING SITUATION** *Please rate the highest level from the* ***past 30 days
0 No evidence of problem with functioning in current living environment.
1 Mild problems with functioning in current living situation. Caregivers concerned about child's behavior in living situation.
2 Moderate to severe problems with functioning in current living situation. Child has difficulties maintaining his/her behavior in this setting creating significant problems for others in the residence.
3 Profound problems with functioning in current living situation. Child is at immediate risk of being removed from living situation due to his/her behaviors.

Check* SOCIAL FUNCTIONING** *Please rate the highest level from the* ***past 30 days
0 Child is on a healthy social development pathway.
1 Child is having some minor problems with his/her social development.
2 Child is having some moderate problems with his/her social development.
3 Child is experiencing severe disruptions in his/her social development.

Check* RECREATIONAL** *Please rate the highest level from the* ***past 30 days
0 No evidence of any problems with recreational functioning. Child has access sufficient activities that he/she enjoys.
1 Child is doing adequately with recreational activities although some problems may exist.
2 Child is having moderate problems with recreational activities. Child may experience some problems with effective use of leisure time.
3 Child has no access to or interest in recreational activities. Child has significant difficulties making use of leisure time.

Check* DEVELOPMENTAL** *Please rate the highest level from the* ***past 30 days
0 Child has no developmental problems.
1 Child has some problems with immaturity or there are concerns about possible developmental delay. Child may have low IQ.

2 Child has developmental delays or mild mental retardation.
3 Child has severe and pervasive developmental delays or profound mental retardation.

Check* JOB FUNCTIONING** *Please rate the highest level from the* ***past 30 days
0 No evidence of any problems in work environment.
1 Youth has some mild problems work (e.g. tardiness, conflict).
2 Youth has problems at work
3 Youth has severe problems at work in terms of attendance, performance or relationships. Youth may have recently lost job.
NA Not applicable. Youth is not currently working nor recently employed

Check* LEGAL** *Please rate the highest level from the* ***past 30 days
0 Child has no known legal difficulties.
1 Child has a history of legal problems but currently is not involved with the legal system.
2 Child has some legal problems and is currently involved in the legal system.
3 Child has serious current or pending legal difficulties that place him/her at risk for a court ordered out of home placement.

Check* MEDICAL** *Please rate the highest level from the* ***past 30 days
0 Child is healthy.
1 Child has some medical problems that require medical treatment.
2 Child has chronic illness that requires ongoing medical intervention.
3 Child has life threatening illness or medical condition.

Check* PHYSICAL** *Please rate the highest level from the* ***past 30 days
0 Child has no physical limitations.
1 Child has some physical condition that places mild limitations on activities. Conditions such as impaired hearing or vision would be rated here. Rate here, treatable medical conditions that result in physical limitations (e.g. asthma).
2 Child has physical condition that notably impacts activities. Sensory disorders such as blindness, deafness, or significant motor difficulties would be rated here.
3 Child has severe physical limitations due to multiple physical conditions.

Check* SEXUALITY** *Please rate the highest level from the* ***past 30 days
0 Child has healthy sexual development.
1 Child has some issues with sexual development but these do not interfere with his/her functioning in other life domains.
2 Child has problems with sexual development that interfere with his/her functioning in other life domains.
3 Child has severe problems with sexual development.

Check* SLEEP** *Please rate the highest level from the* ***past 30 days
0 Youth gets a full night's sleep each night.
1 Youth has some problems sleeping. Generally, youth gets a full night's sleep but at least once a week problems arise. This may include occasionally awakening or bed wetting or having nightmares.
2 Youth is having problems with sleep. Sleep is often disrupted and youth seldom obtains a full night of sleep
3 Youth is generally sleep deprived. Sleeping is difficult for the youth and s/he is not able to get a full night's sleep.

Check* SCHOOL BEHAVIOR** *Please rate the highest level from the* ***past 30 days
0 Child is behaving well in school.
1 Child is behaving adequately in school although some behavior problems exist.
2 Child is having moderate behavioral problems at school. He/she is disruptive and may have received sanctions including suspensions.
3 Child is having severe problems with behavior in school. He/she is frequently or severely disruptive. School placement may be in jeopardy due to behavior.

Check* SCHOOL ACHIEVEMENT** *Please rate the highest level from the* ***past 30 days
0 Child is doing well in school.
1 Child is doing adequately in school although some problems with achievement exist.
2 Child is having moderate problems with school achievement. He/she may be failing some subjects.
3 Child is having severe achievement problems. He/she may be failing most subjects or more than one year behind same age peers in school achievement.

Check* SCHOOL ATTENDANCE** *Please rate the highest level from the* ***past 30 days
0 Child attends school regularly.
1 Child has some problems attending school but generally goes to school. May miss up to one day per week on
average OR may have had moderate to severe problem in the past six months but has been attending school regularly in the past month.
2 Child is having problems with school attendance. He/she is missing at least two days each week on average.
3 Child is generally truant or refusing to go to school.

CHILD STRENGTHS

For **Strengths items** the following action levels are used:

0 indicates a domain where strengths exist that can be used as a centerpiece for a strength-based plan
1 indicates a domain where strengths exist but require some strength building efforts in order for them to serve as a focus of a strength-based plan.
2 indicates a domain where strengths have been identified but that they require significant strength building efforts before they can be effectively utilized in as a focus of a strength-based plan.
3 indicates a domain in which efforts are needed in order to identify potential strengths for strength building efforts.

Check* FAMILY** *Please rate the highest level from the* ***past 30 days
0 Family has strong relationships and excellent communication.
1 Family has some good relationships and good communication.
2 Family needs some assistance in developing relationships and/or communications.
3 Family needs significant assistance in developing relationships and communications or child has no identified
family.

Check* INTERPERSONAL** *Please rate the highest level from the* ***past 30 days
0 Child has well-developed interpersonal skills and friends.
1 Child has good interpersonal skills and has shown the ability to develop healthy friendships.
2 Child needs assistance in developing good interpersonal skills and/or healthy friendships.
3 Child needs significant help in developing interpersonal skills and healthy friendships.

Check* OPTIMISM** *Please rate the highest level from the* ***past 30 days
0 Child has a strong and stable optimistic outlook on his/her life.
1 Child is generally optimistic.
2 Child has difficulties maintaining a positive view of him/herself and his/her life. Child may vary from overly
optimistic to overly pessimistic.
3 Child has difficulties seeing *any* positives about him/herself or his/her life.

Check* EDUCATIONAL** *Please rate the highest level from the* ***past 30 days
0 School works closely with child and family to identify and successfully address child's educational needs OR
child excels in school.
1 School works with child and family to identify and address child's educational needs OR child likes school.
2 School currently unable to adequately address child's needs.
3 School unable and/or unwilling to work to identify and address child's needs.

Check* VOCATIONAL** *Please rate the highest level from the* ***past 30 days
0 Child has vocational skills and work experience.
1 Child has some vocational skills or work experience.
2 Child has some prevocational skills.
3 Child needs significant assistance developing vocational skills.

Check* TALENTS/INTEREST** *Please rate the highest level from the* ***past 30 days
0 Child has a talent that provides him/her with pleasure and/or self esteem.
1 Child has a talent, interest, or hobby with the potential to provide him/her with pleasure and self esteem.
2 Child has identified interests but needs assistance converting those interests into a talent or hobby.
3 Child has no identified talents, interests or hobbies.

Check* SPIRITUAL/RELIGIOUS** *Please rate the highest level from the* ***past 30 days
0 Child receives comfort and support from religious and/or spiritual beliefs and practices.
1 Child is involved in a religious community whose members provide support.
2 Child has expressed some interest in religious or spiritual belief and practices.
3 Child has no identified religious or spiritual beliefs nor interest in these pursuits.

Check* COMMUNITY LIFE** *Please rate the highest level from the* ***past 30 days
0 Child is well-integrated into his/her community. He/she is a member of community organizations and has positive ties to the community.
1 Child is somewhat involved with his/her community.
2 Child has an identified community but has only limited ties to that community.
3 Child has no identified community to which he/she is a member.

***Check* RELATIONSHIP PERMANENCE** *This rating refers to the stability of significant relationships in the child or youth's life. This likely includes family members but may also include other individuals.*
0 This level indicates a child who has very stable relationships. Family members, friends, and community have been stable for most of his/her life and are likely to remain so in the foreseeable future. Child is involved with both parents.
1 This level indicates a child who has had stable relationships but there is some concern about instability in

the near future (one year) due to transitions, illness, or age. A stable relationship with only one parent may be rated here.
2 This level indicates a child who has had at least one stable relationship over his/her lifetime but has experienced other instability through factors such as divorce, moving, removal from home, and death.
3 This level indicates a child who does not have any stability in relationships. Independent living or adoption must be considered.

***Check* RESILIENCY** *This rating should be based on the individual's ability to identify and use internal*
strengths in managing their lives
0 This level indicates a individual who is able to both identify and use internal strengths to better themselves
and successfully manage difficult challenges.
1 This level indicates a individual who able to identify most of his/her internal strengths and is able to partially
utilize them.
2 This level indicates a individual who is able to identify internal strengths but is not able to utilize them effectively.
3 This level indicates a individual who is not yet able to identify internal personal strengths.

APPENDIX B

ABRIDGED VERSION OF THE CANS USED IN THIS STUDY

Child and Adolescent Needs and Strengths- ACT I & ACT II Units

CANS ITEM	0 No Evidence	1 Mild	2 Moderate	3 Severe	U Unknown
Strengths					
1. Family					
2. Interpersonal					
3. Educational					
4. Well-being					
5. Optimism					
6. Talents/Interests					
7. Spiritual/Religious					
8. Community Life					
9. Relationship Permanence					
Traumatic Stress Symptoms					
10. Adjustment to Trauma					
11. Re-experiencing Trauma					
12. Avoidance					
13. Numbing					
14. Dissociation					
Life Domain Functioning					
15. Family					
16. Living Situation					
17. Developmental/Intellectual					
18. Legal					
19. Medical					
20. Physical					
21. School Behavior					
22. School Achievement					
23. School Attendance					
Child Behavioral/Emotional Needs					
24. Substance Abuse					
25. Attachment Difficulties					
26. Affect Dysregulation					
27. Somatization					
28. Anger Control					
Child Risk Behaviors					
29. Other Self-Harm					
30. Danger to Others					
31. Runaway					
32. Delinquency					
33. Judgment					
34. Fire Setting					

ACT I **ACT II**

APPENDIX C

ACUITY OF PSYCHIATRIC ILLNESS SCALE—CHILD AND ADOLESCENT VERSION (CAPI)

Acuity of Psychiatric Illness Scale—Child and Adolescent Version (John S. Lyons ©): *Rating Sheet*

ADMINISTRATION. Read the items below and rate them based on the past 24 hours. Indicate your rating by circling from the options (0,1,2,3 or U) for each item. See the Acuity of Psychiatric Illness Scale- Child and Adolescent Version manual for any rating questions.

Items	None	Mild	Moderate	Severe	Unknown
Risk Behaviors					
1. Suicidal Ideation or Gesture	0	1	2	3	U
2. Self- Mutilation Behavior	0	1	2	3	U
3. Aggressive Behavior towards people	0	1	2	3	U
4. Aggressive Behavior Towards Objects	0	1	2	3	U
Symptoms					
5. Impulsivity	0	1	2	3	U
6. Reality Assessment (e.g., psychosis)	0	1	2	3	U
7. Noncompliance	0	1	2	3	U
8. Depression	0	1	2	3	U
9. Anxiety	0	1	2	3	U
10. Sleep Disruption	0	1	2	3	U
11. Activity Level: Over-active (e.g., "agitated")	0	1	2	3	U
12. Activity Level: Under-active	0	1	2	3	U
13. Sexualized Behavior	0	1	2	3	U
Functioning					
14. School Functioning	0	1	2	3	U
15. Peer Functioning	0	1	2	3	U
16. Self-Care Functioning	0	1	2	3	U
17. Nutritional Status	0	1	2	3	U

Demographic and additional clinical information

Date:_____
Time: __ :____ AM PM
1. Patient Number: _____
2. Medical Record/Chart ID Number _____
3. In the past 24 hours, has the child been in physical restraint?
Yes No
If Yes, how many times?_____
4. In the past 24 hours, has the child required additional medications (e.g., unscheduled medications such as "PRN")?
Yes No
If Yes, how many times?_____
5. In the past 24 hours, has the child been in seclusion?
Yes No
If Yes, how many times?_____
6. Did the patient have phone, electronic (e.g., email), or face-to-face contact with a parent/relative, or guardian over the past 24 hours?
Yes No
6. Was the child or will the child be discharged today?
Yes No

ACT I	ACT II

APPENDIX D

INFORMED CONSENT

Informed Consent to Participate in ACT Unit Program Evaluation

X Healthcare (XH) is committed to improving its services to children and families. In order to accomplish this goal, we have begun to collect data on the children and adolescents served on the ACT unit. The primary tool we have begun to use is a 17-item assessment known as the Acuity of Psychiatric Illness, Child and Adolescent Version ("CAPI"). The CAPI, which is rated on a daily basis by our nursing staff, asks the staff to rate the child's symptoms and functioning on a zero to 3 scale (0= no problem; 3= serious problem). Staff are asked to use the scale to rate the youth on experiences such as suicide, sleep functioning, and peer relationships on the unit. Our ability to quantify your child's experiences on these domains is important to understanding your child's progress in treatment and prioritizing treatment goals. There is nothing in this rating tool that will not be stated in narrative form in the youths' medical record.

In addition to its use as a tool to inform treatment planning and progress for your child, we will use the information later for research purposes to help us understand the outcomes of the youth served at our facility. In order to do this, we will pool together all the data collected on the youth served at XH to study how well we are helping our patients in treatment. We will keep all of your information confidential. Your child's name and related protected health information will never be included in any of the reports, and none of the data will be linked to you or your child in any way. Therefore, all information we collect regarding your child will be de-identified throughout the entire course of the study and aggregated for analysis. Therefore, there is no risk to participation beyond any experienced in the typical course of life. We anticipate that a total of 300 youth and families will be participants in the study over the study period.

You do not have to agree to allow your youth's data to be a part of the evaluation. Even if you agree to participate now, you may stop participating at any time. Refusing to be a part of the evaluation will not affect your participation or the services your child receives from the ACT Unit. Finally, there are no direct benefits to you or your child for participation in the study.

If you have any questions about the study you may call X X, Director of Therapeutic Programming or X X, Compliance & Privacy Officer, at XXX-XXX-XXXX. You may also contact Scott Leon, Ph.D. at Loyola University Chicago at 773-508-8684.

By signing below, you confirm that this form has been explained to you and that you understand it. Please Check One:

__ AGREE TO PARTICIPATE
__ DO NOT AGREE TO PARTICIPATE

_____ _____
Parent/Guardian Signature Date

_____ _____
Witness Signature Date

_____
Child's name (printed)

APPENDIX E

INTAKE FORM

Today's Date_____

Inpatient Outcome Study: Intake Information Form

1. Patient Number: _____

2. Medical Record/Chart Number: _____

3. Which of the following services has the child received within the past 3 months (check all that apply)?

□ Individual Psychotherapy □ Family Psychotherapy
□ Group Psychotherapy □ Medication Management
□ Tutoring □ Mentoring
□ Occupational Therapy □Physical Therapy
□ Other (list all that apply):_____

4. Gender: □ M □ F **5. Age**:_____ **6: Patient Zip Code**:_____

7. Previous dates of service at <u>this</u> facility:

Admission date:_____ Discharge date: _____
Admission date:_____ Discharge date: _____
Admission date:_____ Discharge date: _____
Admission date:_____ Discharge date: _____
Admission date:_____ Discharge date: _____

8. Previous dates of service at <u>other</u> facilities, such as another local hospital:

Admission date:_____ Discharge date: _____
Admission date:_____ Discharge date: _____
Admission date:_____ Discharge date: _____
Admission date:_____ Discharge date: _____
Admission date:_____ Discharge date: _____

9. Current custody status:

□ Child Welfare
□ Biological Parent
□ Adoptive Parent
□ Other:_____

10. Current living situation:

□ Biological Parent
□ Foster Parent Non-Relative
□ Relative Foster Parent
□ Other Parent :_____
□ Residential or group home placement
□ Shelter
□ Other :_____

11. Is the child homeless? □ Yes □ No

12. Is the child being transferred from another inpatient facility or unit?

□ Yes □ No. If yes, how many days was the child served on the other unit?_____ days

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